

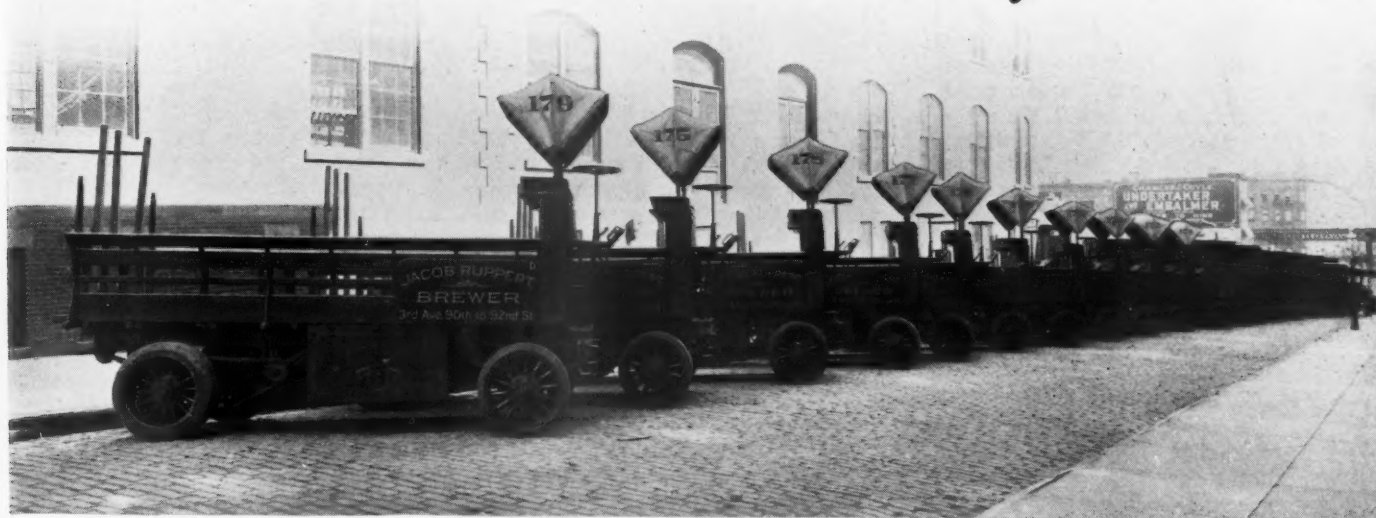
The Commercial Car Journal

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The Motor Truck in Brewery Service



A Thousand Are So Used in New York City. Forms Used in Keeping Records of Their Cost, and Special Loading and Unloading Equipment

By GEORGE W. GRUPP

MOTOR trucks have become very important to the brewing industry and nowhere more so than in Greater New York. Here space and time mean much because of the high rents, wages and property values. The extra space required for housing horses and wagons may be used more advantageously. All of this is appreciated by the brewery folk and their confidence in the motor truck as the proper means for distributing their output is shown by the fact that they are now employing over 1000 trucks of different makes and capacities.

This fleet of 1000 consists mainly of electrics. To be more exact, about 800 are electrics. The gasoline trucks are used for long hauls and operate within a radius of 50 miles, while the electric trucks cover the territory within 10 to 15 miles from the

brewery, being especially satisfactory for local deliveries where frequent stops are to be made. Most of the trucks hauling bottled beer are $3\frac{1}{2}$ tons capacity, while the keg beer trucks are 5 tons capacity. The motor truck is so popular with the local brewers because it has reduced their cost of delivery 50 per cent. and more and enabled them to increase their territory.

Before going into some of the methods of handling fleets, it may be mentioned where most time is lost in making deliveries and through no fault of the truck. Often the saloon ice box is in an inconvenient and out of the way place. Again, the stairway or draught beer opening that leads to the cellar is poorly constructed and arranged, and not infrequently the driver must waste time finding the proprietor to get him sign the delivery book. All of these little delays amount to a considerable

total and seriously handicap a truck that may be obliged to go all the way to Peekskill, Port Jefferson, Dover, N. J., or some other distant point. Therefore if the maximum efficiency is to be attained these time losses must be minimized.

Jacob Ruppert's Fleet

To get to the bottom of this time losing matter some of the brewers are keeping close tabs on their trucks. Jacob Ruppert's brewery is an example. It operates 139 5-ton, six 2 and 4 $3\frac{1}{2}$ ton G. V.'s; four 6-ton Macks; one 6-ton G. M. C.; four 6-ton Mercedes; six 6-ton Commerces and eight 6-ton Bussings. To this fleet within the next month will be added six 5-ton G. V.'s and six 6-ton Commerces. The head-piece of this article shows a part of Jacob Ruppert's fleet.

"Each night," began James Scanlon, the traffic manager of the Ruppert Brewery,

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"When the driver leaves the platform he is given a driver's record time sheet on which the stops are noted. He then notes on the sheet the time of arrival, the number of quarters or eighths delivered and empties received and the time he left at each stop. His route has been arranged for him so that he is able to make twelve stops with the first load, seven with the

ber of stops made, remarks and the number of cases he wants for the following day. After noting these facts on the slip and the shipping department has noted the number of cases he wants, it is then hand-

[illegible]

On this is recorded the expense of operating and maintaining each car.
Actual size: $9\frac{3}{8}$ x 12 in.

ed to the mechanical department. The mechanic then notes the number of the truck, gasoline and oil consumption, repairs he made, supplies needed, time required, and the condition in which he delivered the truck to the driver."

Route		DRIVERS RECORD TIME SHEET			
JACOB RUPPERT					
1 Load		/2	/4		
Stops	Address	Arrived	Delivered 1/2 3/4		Empties 1/2 3/4
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
2 Load		/2	/4		
1					
2					
3					
4					
5					
6					
7					
3 Load		/2	/4		
1					
2					
3					
4					
Delays:		Driver:			
		Helper:			

For its readers—information; for its advertisers—results. That's the purpose of the CCJ

<p><i>Car No.</i></p> <p><i>Gas</i> <i>Oil</i></p> <p><i>Repairs</i></p> <p>.....</p> <p>.....</p> <p><i>Supplies</i></p> <p>.....</p> <p><i>Time</i></p> <p><i>Condition</i></p> <p>.....</p> <p><i>Mechanic</i></p>	<p align="center">Jacob Ruppert's Bottling Department</p> <p align="center">90TH STREET AND THIRD AVENUE</p> <p>Date, 1916—Month Day</p> <p><i>Car No.</i></p> <p><i>Mileage</i></p> <p><i>Condition</i></p> <p>.....</p> <p><i>Time out</i> <i>Time in</i></p> <p><i>Chauffeur</i></p> <p><i>Route</i></p> <p><i>Number of Stops</i></p> <p><i>Remarks:</i></p> <p>.....</p> <p><i>Load following days:</i></p> <p align="center">o</p>
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Two sides of the form filled out by the Bottling Department drivers.
Actual size: $4\frac{3}{8}$ x $6\frac{3}{8}$ in.

[illegible]

This form must be filled out, signed by the mechanic and countersigned by the foreman before any repair parts or materials are issued.
Actual size: 6¼ x 7¾ in.

The keg department trucks use a separate repair car sheet. When the mechanic for either (bottle or keg) departments trucks is finished with the sheets he files them in the traffic office. Here a separate cost sheet is used for each car. On the top of the sheet the truck's number, the chassis number and the license number are noted. Underneath this the date, nature of repair, material used, cost of material, cost of labor, etc., are noted.

More exhaustive records than these are kept. In the gasoline and electric garages large sheets are posted. On these sheets

A separate record is kept of the daily gasoline consumption for the month of all gasoline cars.

Another form used is in connection with repairs—a requisition on the garage stock clerk for any materials and for what car. This is signed by the mechanic and the foreman.

The J. Chr. G. Hupfel Brewing Company

The J. Chr. G. Hupfel Brewing Co., which operates twelve 5-ton G. V.'s and two 5-ton Pierce-Arrows, uses a less elaborate system of keeping tabs on its trucks.

cost of batteries, tires, repairs, number of barrels carried, total weight of each kind of beer, depreciation, interest on investment, etc., we find that a truck does not begin to show any signs of real profit until 1000 miles has been covered. I might add that it costs us \$.05 to \$.06 a barrel less to deliver by truck than by horses.

"There is one thing I like about our gasoline trucks," he continued. "We are now able to make two trips a week through our suburban territory. And if the Long Island Railroad refuses to accept a rush order to one of our customers who is caught

JACOB RUPPERT'S BREWERY										ELECTRIC GARAGE		DATE		191	
BOTTLING DEPT.															
VEH. No.	MILES 1st TRIP	MILES 2nd TRIP	MILES 3rd TRIP	TOTAL MILEAGE	NO. OF BOXES FULL	NO. OF BOXES EMPTY	TOTAL WEIGHT	CONDITION OF VEHICLE AND REMARKS		TIME OUT	TIME IN	NAME			
10															
11															

JACOB RUPPERT'S BREWERY										ELECTRIC GARAGE		DATE		191	
KEG. DEPT.															
VEH. No.	MILES 1st TRIP	MILES 2nd TRIP	MILES 3rd TRIP	TOTAL MILEAGE	NO. 1/2 KEGS FULL	NO. 1/2 KEGS EMPTY	TOTAL WEIGHT	CONDITION OF VEHICLE AND REMARKS		TIME OUT	TIME IN	NAME			
170															
171															

JACOB RUPPERT'S BREWERY										GAS GARAGE		DATE		191	
KEG & BOTTLING DEPT'S															
VEH. No.	MILES 1st TRIP	MILES 2nd TRIP	MILES 3rd TRIP	TOTAL MILEAGE	NO. 1/2 KEGS FULL	NO. 1/2 KEGS EMPTY	TOTAL WEIGHT	CONDITION OF VEHICLE		TIME OUT	TIME IN	NAME			
148															
288															
243															

Large Sheets Posted in Garage

In the electric garage, the bottling department and keg department sheets are separate; one answers for both in the gas garage. Actual size: 17 in. wide by 33½ or 27¾ in. long, depending on the number of cars

the driver opposite his vehicle number, straight across the sheet, notes the mileage for each trip, total days mileage, number of full kegs or cases hauled and empties returned, total weight for the day, the condition of the truck, time in and time out, and last he signs his name. Thus one is able to see how much all the trucks have accomplished in a single day. They also keep separate record sheets for gasoline consumption and garage requisition sheets. It is evident that a careful and exhaustive cost system such as this is revealing many undreamed of conditions and facts.

A single repair and inspection record is used for both gasoline and electric trucks. As each part is inspected its condition is carefully noted.

"As we have our own charging plant," said Adolph Hupfel, "we find that it only costs us, for current, \$75 a year per electric trucks, while the cost of operating a gasoline, which is perfectly natural, is considerably more. Each truck is thoroughly overhauled and repainted each year, whether it needs it or not. Further, as we keep a separate account of each truck as to the

short, we are now able to send one of our trucks out instead."

A unique and commendable feature of this company's method of loading is that no lifting is necessary. As the kegs are filled they are carried from the filling apparatus to the loading platform by an endless conveyor, which is on a level with the floor. Both loading and filling departments are on the same floor and level. As the keg is filled, corked, sealed and stamped, it is rolled onto the conveyor, which carries it to the loading platform. Here is a ser-

Why is the CCJ the only truck paper a member of the Audit Bureau of Circulations? Here's food for thought

of the initial load with which they left the plant, because as the drivers unload kegs or cases of beer, they always load empties onto the truck."

Use Truck as Moving Billboard

"During the summer, spring and autumn we use our emergency truck, as we call it, as a moving bill board, which travels

"We believe in safety first," said Mr. Geiger, as he pointed to one of their trucks which was equipped with all sorts of safety devices. "And because we believe it pays we are equipping our trucks with guards of all kinds, so as to minimize injuring any one who happens to run in the path of our truck. Our tailgate, as you will notice, has no sharp corners or edges, and all

to the garage and give the drivers a talk on traffic regulations, how to avoid accidents on the street and first aid to the injured. In other words, we believe in educating our drivers to be the best possible."

Methods of Loading, Etc.

The Doelger method of loading kegs is unlike any used in New York. They have no loading platform. Instead they have six small openings leading out on the 55th Street side of the plant. And the large glass shelter roof which extends along and over the sidewalk of the building gives it the appearance of a hotel. The curb has been sufficiently cut away so that the rear end of the truck may be close up to the building and near the opening. When the truck is in place a drawbridge, which forms a cover over the opening when not in use, is lowered to the level of the truck. Then the kegs are rolled out onto the truck. These six openings have a loading capacity of 3000 half-barrels in 45 minutes. However, at present, only three of these are used at one time.

Bottle beer is unloaded and loaded by means of gravity, roller, spiral and vertical conveyors. These conveyors may be switched like railroad tracks to prevent one place from being flooded with too many cases.

To unload empty kegs a unique device is used. To prevent the driver from bumping into the device bumpers with old tires as cushions are used. Once the truck is in place all the driver has to do is to throw the kegs onto a gravity conveyor, which rolls the kegs to the rear of the room, where they are washed. When the kegs reach the terminus they are stacked up to await their turn to be carried to the washing machine by a portable gravity track conveyor. This is very novel and practical.



Four Five-Ton Trucks About to Leave the Hupfel Plant

At each end of each entrance to the loading platform are unloading chutes, one of which may be seen at the right

through the theatrical district to meet the theatregoers as they come and go to the theatre at night. Several hundred electric lamps form a border around the edge of the truck body. The name Peter Doelger is spelt out in electric lights. It makes a very attractive 'ad.' The current for these lights is supplied by an extra large storage battery."

A Complete Garage

All of the motor trucks are housed in a five-story 85 x 100 ft. garage, which is perhaps the best and most complete garage owned by any brewery in the city. Every man working in it is a specialist. That is, each man is asked to do only one certain kind of work in connection with repairs, so that he may develop the highest proficiency in his particular duty. All gasoline and electric garagemen have no connections with each other. No electric truck specialist is ever permitted to repair a gasoline truck. An emergency man is also employed, whose sole duty is to be ready to care for any trouble that might happen to any one of the trucks while on the road. The trucks are taken from floor to floor in the garage by a 30 x 15 ft. elevator. Throughout the building is well lighted and equipped.

The garage is so arranged that electrics may be charged on any floor. To remove a battery from a truck, specially designed tray trucks with swivel castors are used. These tray trucks may be pushed under the battery box so that with little or no lifting the battery may be removed or replaced. The hot soap water barrels used in washing the trucks are also moved about the garage on swivel castor wheels. The castors are attached to the barrel itself.

shackle bolts are covered. This we did to prevent any one from stealing a ride and then falling off. All of our mud guards are being designed so as not only to serve that function but, by being extended far enough over the wheels, to push a person from the wheel if he is struck. More than that, ever so often we have Dr. Pinok and Police Sergeant Alex. Knittle come down



A Five-Ton Truck Used by Peter Doelger

One of those handling bottled beer. The drawbridge covering the loading opening to the platform, as seen at the left, drops to the level of the truck floor when loading and unloading

Besides the duties already mentioned the trucks are used to haul coal from emergency storage bins to the boiler house. Further, during the last year the trucks hauled 400 carloads of malt, rice, hops, bottles, barrels, boxes, etc., from freight cars to the plant, besides their regular duties and the moving of bar fixtures, etc. One truck alone has been able to haul 300 gross of bottles from 41st Street and the North River to 55th Street and First Avenue, the location of the plant, in a day of eight working hours. Just as remarkable feats have been performed by the trucks that haul malt, which is unloaded from the trucks into a hopper.

The Great Saving Due to Motorization

In concluding his remarks, Mr. Geiger said, "In 1910, when we completely motor-

MASTER CARBURETOR DEALERS HOLD CONVENTION

On January 10th and 11th, at the Park Avenue Hotel, New York City, the first dealers' convention ever held by a carburetor concern was held by the Master Carburetor Corp., at which over 200 dealers were present. Arthur L. Jelley opened the convention and spoke on Master carburetors, past, present and future; R. M. Anderson, chief engineer, spoke on carburetors and carburetion. After Mr. Anderson's talk, all the dealers took part in the discussion on the papers. T. A. B. Richard, chief draughtsman, gave an interesting talk on flanges and fittings. On January 11th, H. R. Dougherty, sales manager of the American Chiclé Co., gave his viewpoint of

E. T. Dodd, of Sidney, Australia; Charles Coon, of Drenco Machine Co., New York; C. F. Trich, of the advertising firm of Ruthrauff & Ryan; E. T. Daniels, secretary of the Master Carburetor Corp., spoke on efficiency and co-operation in filling orders; A. B. Walton, sales manager, spoke on selling and service. The convention was concluded with a banquet.

THE WESTINGHOUSE WILL ERECT PLANT NEAR PHILADELPHIA

A site embracing 500 acres with a frontage of a mile along the Delaware River has been purchased at Essington, Pa., near Philadelphia, by the Westinghouse Electric & Mfg. Co., of East Pittsburgh, Pa., on which will be erected a large plant. The initial development will cost in the neighborhood of \$5,000,000 or \$6,000,000, occupying about one-fifth of the area of the entire plot. Two large machine shops and an erecting shop for heavy machinery, forge shop, pattern and pattern storage shop and a power house will be built, the work being started as soon as satisfactory building contracts can be let. Several thousand people will be employed at first, and the number increased as necessity demands. This new center will be devoted to the production of heavy apparatus, such as steam turbines, compressors and reduction gears.

THE DEARBORN MOTOR TRUCK COMPANY REORGANIZED

Under the name of the Dearborn Truck Co., Chicago, the Dearborn Motor Truck Co., has been reorganized with a capital stock of \$550,000. S. D. Porter, formerly vice president and general manager of the Smith Form-a-Truck Co., has purchased an interest in the new company and has become vice president, treasurer and general manager. W. J. Kendrick, who founded the old company last March, remains as president. W. J. Farnsworth is general auditor and C. E. Stuart is sales manager. He was formerly associated with the Smith-Form-a-Truck Co. as assistant general sales manager.



Another Doelger Truck

This also is of the five-ton electric type, but equipped with a body for handling kegs

ized our delivery system, we replaced 126 horses and 54 wagons with 27 trucks. By replacing the horse-driven outfit with trucks we were able to convert a one-story stable, 250 x 100 ft., valued at \$80,000, into a bottling department, which is very much more profitable than a stable for the housing of horses and wagons. Where formerly our drivers and loaders were obliged to get to work at 3 and 4 o'clock in the morning, they now get here at 6 A. M. During 1916, without an increase in the present number of our motor vehicles, and in spite of the fact that they were a year older, we were able to deliver 50,000 more cases and 14,000 more kegs of beer than the year preceding. All of which one must confess is excellent testimony for the truck as an important factor in the brewing industry."

GRAY TRACTOR MFG. CO. has moved to its own office and shop at 30th Ave., S. E., and N. P. Tracks, Minneapolis, Minn.

C. O. FUNK, agent for the Hudson Super-Six and Moline-Universal tractor, is in a new location on Fourth St., west of the Larkins Hotel, Larned, Kans.

a Master carburetor from an owner's standpoint. Other addresses were made by



Western Firestone Dealers Who Attended Los Angeles Convention

Over three hundred dealers attended the Firestone Dealers' convention, January 31, at Los Angeles. The event marked the dedication of the new Firestone Branch, one of the largest on the Pacific Coast

The CHILTON ideal—honest circulation; results to advertisers—fully exemplified in the CCJ

CATERPILLAR TRACTORS MAY REPLACE ARMY MULES

An efficiency contest between the army mule and the most modern type of gasoline tractor is soon to be made at Fort Sam Houston, Tex. Army officers believe that the tractors can very readily be used to do the work which was formerly done exclusively by the army mule. The coming contest will consist of seeing which is the better and more economical method of transporting pontoon bridge units of the army. The engineering department at Fort Sam Houston thinks that the caterpillar tractor engines can be used in the place of mules for this purpose at a smaller cost of operation and that the work can be more expeditiously done. When the army is on the march the task of transporting the pontoon bridge equipment is ordinarily a big one. A pontoon equipment which carries equipment sufficient to construct 225 ft. of bridge is consigned to each army division. There must be carried, in addition to the boats that are necessary, 12,800 lbs. of supports, a large amount of lumber and planking, together with bolts, tie ropes, stakes and other materials. Fourteen mule drawn wagons are required to transport one pontoon unit under ordinary circumstances, and to each wagon there must be attached 4 or 6 mules,

making a total of 56 to 84 animals. Not only are many mules required for transporting each unit, but so often the roads are so difficult that wagon trails cannot reach some of the more remote camps. The caterpillar tractor, it is believed, can overcome these difficulties, in the movement of pontoon bridge units and other heavy transportation service. The contest will be under the direction of Col. Wm. C. Langifft. Three caterpillar tractors are being tried out in the Big Bend country, and they will be brought to Fort Sam Houston for the proposed contest. The passing of the army mule means the removal of the last connecting link between modern military operations and those which were used in the days of Indian warfare in the West and Southwest.

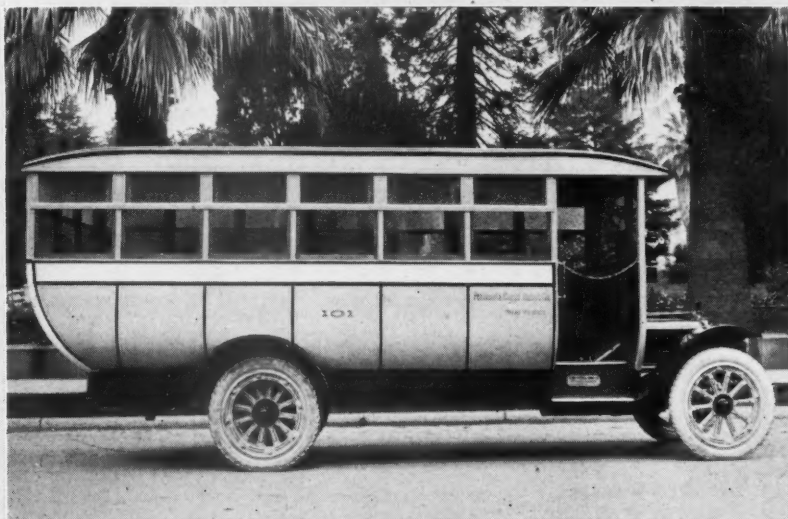
ENGLISH AUTOMOBILE MANUFACTURE RESTRICTED TO TRUCKS

On December 15th, the British government forbid the manufacture of passenger automobiles in England by English makers. Previous to that time the Ford Motor Co., at its factory in Manchester was turning out 200 pleasure cars a week. Since December 15th the activities of the Ford Co. and other automobile factories have been restricted to ambulances, delivery wagons, etc. The Minister of Munitions, which has the

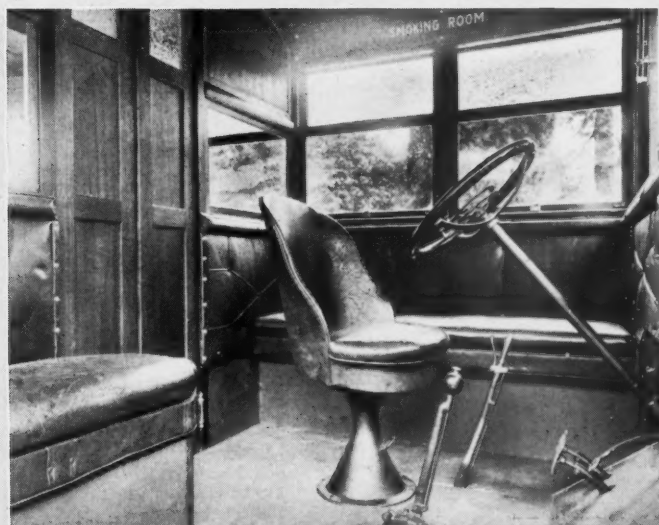
direction of all the automobile factories in England, for the purpose of control, has divided the entire industry into three divisions—A, the manufacture of pleasure cars (which manufacture has been stopped); B, manufacture of commercial cars, and C, automobile repair work. An order has been issued to proceed more slowly in the manufacture of commercial cars, and an order limiting the amount of any repair job to \$50 has been issued. If a repair job on a passenger car exceeds this amount, a special permit must be secured from the government. Previous to the war there were 4000 dealers and garagemen in England, but many dropped out soon after the beginning of the conflict, and those remaining have been selling American cars and trucks. Since the importation of American cars has ceased, many London dealers have been using their lathes on sub-contracts for munition manufacture. There are many women drivers on taxicabs and light delivery cars. Gasoline is selling at \$.68 per gal.

ATTERBURY MOTOR TRUCK Co. has recently completed \$25,000 worth of improvements to its factory, thereby increasing its output. A system of production has been worked out which makes it possible to turn out more cars in a shorter time than ever.

Exterior and Interior Views of a Motor 'Bus Body Designed and Built by the A. Meister & Sons Company, Sacramento, California.



Built for the Peninsular Rapid Transit Company, running between San Francisco, San Mateo, and Burlingame, California.



AN INNOVATION IN MOTOR TRUCK SELLING

RE. TAYLOR, president of the R. E. Taylor Corp., 1457 Broadway, New York City, has just announced a new method of selling trucks which is revolutionary and which, he believes, is the solution of the long vexed service problem.

Briefly, the plan is to charge for the service and the parts used in repairing and to return all profits made at the end of the year in proportion to the amount spent by each user.

In commenting on this new plan, Mr. Taylor says: "It is not today a question with the business man as to the necessity to him and his success in competition with others in his line that he should have motor transportation for his product. He knows all that. Today the great, big, vital question with him is, 'When I buy a motor truck, can I have the assurance that I can keep that truck at work for me practically all the time?' In other words he knows that the truck is only a piece of machinery



R. E. TAYLOR

Sponsor of the new service plan

after all and must, therefore, need many things done to it and for it under the heavy strain it is constantly put to. If a little break occurs or a nut needs tightening or something about it needs 'fixing'—can he be assured that his truck can be attended to by a proper expert promptly and sent back to work again with small loss of time and at reasonable cost for repairs?

"It really seems to be the attitude of some service departments that when they do get the truck into their clutches for repair or overhauling, to squeeze the unfortunate owner to the limit—because he must have the truck and will submit to almost any form of extortion to release it. I honestly believe that it is as possible to be decent in selling and caring for a motor truck after it is sold as it is to do the same thing for a high-priced watch for instance. Therefore, I'm going to be the pioneer in the newer way of treatment. In brief, my plan is this: To return to the man who buys a motor truck from me every penny he spends with me for parts or repairing above the actual cost to me of said parts and repairing."

The truck which Mr. Taylor will sell under the new service plan is the Gramm-Bernstein, made by the Gramm-Bernstein

Co., Lima, O. Mr. Taylor has signed a contract which gives him absolute control of both the sales and service department of the Gramm-Bernstein motor truck for twenty years for the states of New York, Pennsylvania, Maine, Vermont, New Jersey, Massachusetts, Connecticut, Rhode Island, New Hampshire, Maryland, Delaware and the District of Columbia. Conveniently located service stations will be located throughout this territory where a full supply of parts will be always on tap and where competent workmen will promptly do what overhauling or repairing is needed. A charge will, of course, be made for this service, but at the end of the year, when the cost sheets are made up, whatever sums may have been paid by the owner which are found to have been in excess of his proportionate share for the work done or parts supplied will be returned to him.

MOTOR TRUCK AMBULANCE FOR "OLD DOBBIN"

By ALBERT MARPLE

It seems like "rubbing it in" to carry "Old Dobbin," when he is injured, to the hospital in the very type of vehicle that is so rapidly replacing him, but that is just what is being done in Los Angeles, Cal., the "down-to-the-minute" animal ambulance shown in the accompanying illustrations being used. In this, as in other lines, when the very earliest and most efficient service is to be secured the science of the motor world is drawn upon. This vehicle contains the latest improvements in motor ambulances for the conveying of sick and injured animals to places where they may receive immediate treatment, and for this reason it is attracting considerable attention. It has just been delivered to the humane department of Los Angeles by the Pacific Kissel Kar branch at that place.

There are only nine similar vehicles in the United States, two of these being in California. The first ambulance of this style to be constructed was built in San Francisco. The fame of that structure spread rapidly and requests for the plans were made by officials of a number of cities, the latest of these being Baltimore, in which city one of these humane trucks is now in course of construction.

For the construction of this ambulance a 1½-ton truck was used. Upon this an especially designed body has been placed. The

body has heavy front and side panels, which are padded for the protection of the invalid quadrupeds. The tail gate, as high as the panels or sides, may be lowered and raised automatically by power furnished from the truck's engine. The floor of the ambulance is movable, so that it may be run out of the rear of the vehicle, and after the invalid animal has been placed upon it, may be drawn, by the engine's power, to its proper location within the ambulance. This movable floor is equipped with special harness by which the animal when once upon it may be held securely in one position until the hospital is reached, this making it impossible for the beast to scramble to its feet, if excited, thereby receiving injuries or setback which might prove fatal.

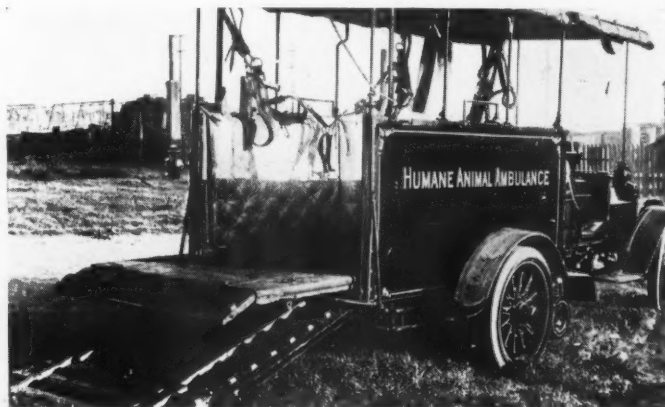
Specially designed harness has also been provided for the retaining of the animal in any position desired within the machine, this harness being hung from the top and sides of the car. The harness also stops the animal from moving after once the desired position has been secured. The ambulance has also been provided with a gate and runway at the left and near the front of the "bus," this making it possible to lead the horse out that way instead of backing him through the rear entrance, provided locomotion will effect no further disablement.

No matter how it is desired to handle the animal, power for this operation is furnished by the engine of the truck, this being one of the leading features of the ambulance. This power is governed by two levers located at the rear of the driver's seat. These levers throw chains in and out of gear whenever their use is demanded in the handling of the animals. The ambulance is also provided with side, front and rear curtains, these permitting the vehicle to be entirely enclosed in inclement weather. This ambulance is a time and money saver. Promptness and efficiency, which are to be found in the use of motor vehicles in all lines, are also to be seen here. By the use of this device it has been found that animals may be handled with the greatest speed and care which up to this time has been impossible.

RAINIER MOTOR CORP., Bayside Avenue, Flushing, N. Y., has completed its factory and is now shipping 10 trucks per day. The executive and sales departments have been removed from the New York show room to the factory.

Rear View of Ambulance

The gate is raised and the floors drawn in by engine power.



Plenty of the right kind of circulation means quantity results to advertisers in the CCJ

U. S. BUREAU OF MINES' REPORT ON GASOLINE

The United States Bureau of Mines, Department of the Interior, has just issued Technical Paper 163, "Physical and Chemical Properties of Gasoline Sold Throughout the United States during the Calendar Year 1915," by W. F. Rittman, W. A. Jacobs and E. W. Dean.

The paper reports work done for the purpose of informing the public as to the similarities and differences of the various products sold throughout the country as motor fuel. Fifty-two samples, representative of the several producing fields of the country, were secured and submitted to detailed physical and chemical examination in the laboratory. Tests were also made of the power that could be developed from typical samples when used in an automobile engine.

The laboratory experiments showed that there were wide differences among the various products sold as motor fuel. The differences were most noticeable with regard to the properties of volatility, gravity and content of unsaturated hydrocarbons. The variations were so great that it appears necessary in defining gasoline to say that these properties fall within certain wide limits and are by no means sharply defined.

By noting these properties and the relations among them, it was found possible to tell whether a gasoline was derived from petroleum produced in the eastern, mid-continent or California fields and also whether the process of production was one of "straight" refinery distillation, "cracking" or blending.

Mid-continent gasolines were from 2½ to 3½ deg. Baumé heavier than eastern gasolines of equal volatility. California gasolines were from 4 to 8 deg. heavier than equivalent eastern products.

Evaporation losses were shown to be proportional to the percentage of low-boiling constituents in a gasoline.

Representative types from the list were tested for calorific value and power development. It was found in general that the lighter (high-Baumé gravity) gasolines had more heat units per unit weight and developed more power. The differences were so small, however, as to minimize the advantage of using these products, which are more expensive than the heavier motor fuels, and also much more subject to loss through evaporation. The general conclusion reached was that the heavier gasolines, which are now most common in the market, have decided advantages over the older type of lighter "high test" products.

KEROSENE: THE TRUCK FUEL OF THE FUTURE

According to E. E. Grant, secretary of the Independent Oil Men's Association, within five years 70 per cent. of all crude oil produced above 30 gravity will be converted into fuel, and the balance will supply the lubricants necessary to keep the engines and bearings cool. At a zone convention of the Oilmen's Association recently held in Washington, D. C., it was stated that commercial cars would use kerosene as a fuel, but the association was divided on the practicability of this fuel for pleasure cars. It was agreed that, owing to the increase in the number of cars in use, it will be difficult to obtain fuel in sufficient quantity to supply the demand within from three to five years. The adaptation of kerosene as a satisfactory fuel would help to solve the problem.

MOTOR TRUCK CLUB OF AMERICA REPORTS PROGRESS

The Motor Truck Club of America, Inc., is sending to its members a message, the following extracts from which will interest our readers:

The need for such an organization as ours is proved by the growing tendency of state, city and village authorities to look upon the motor truck with somewhat the same suspicion and antagonism as the steam locomotive was subjected to in the early states of its development.

New York State is imposing greatly increased taxes on motor trucks and omnibuses, and in addition to this form of legislation, we are confronted with new proposals to establish conditions of operation.

City officials are endeavoring to control what they consider excessive damage to city streets through the operation of heavy vehicles, and it is important to all users of trucks that such a proposition shall not be carried out in an unduly restrictive way, or on a basis that will tend to retard the development of the ideal road bed and road surface for heavy local traffic, and the general adoption of a progressive policy of road improvement, and consequent increased delivery efficiency and reduced operating expense.

The pending attempt on the part of the village of "Cranford" to restrict the use of certain of its streets to vehicles, weighing with load less than four tons, is a matter of grave importance, as many other such villages have publicly announced their intention to similarly close their streets for auto truck traffic, if Cranford can establish a favorable precedent for such action.

In New York City, we are directly concerned in the problem of relieving the excessive delays in certain of our local streets due to intolerable and yet increasing congestion of traffic. The problem of how to maintain a reasonable rate of travel, and at the same time protect pedestrians, is of growing concern and of actual "dollars and cents" importance, and the Motor Truck Club of America is working hand and hand with the responsible public officials to arrive at the best solution of this problem.

We are doing work that should have the support of every user of motor trucks, and the direct financial benefits available to every member through favorable insurance rates, and in other less direct though no less real advantages, should serve as a sufficient inducement to the prospective member.

NEWARK'S ANNUAL AUTOMOBILE SHOW, which will be held in the First Regiment Armory, February 24th to March 3rd, will include motor trucks and commercial delivery cars, as well as pleasure cars. The south and west ends of the main floor of the building will be given over to the truck section and the display will be a representative one. Claude E. Holgate is manager. Outside dealers, as well as Newark motor truck firms, are permitted to enter the show, the same rule applying to pleasure cars, motorcycles and accessories.



Two-Ton Diamond T Headed for Tampa

To prove the stamina of his trucks, C. A. Tilt, president of the Diamond T Motor Car Company, of Chicago, has sent one of his two-ton trucks, carrying a capacity load, over the Dixie Highway. The truck left Chicago for Tampa, Fla., last Sunday, and will deliver two tons of spare parts to Hixon & Warder, South Florida distributors for the Diamond T Company. To undertake the job of seeing the truck through, Mr. Tilt selected two Northern woodsmen as chauffeurs. They are Bill Paull and Tom Phillips, who are celebrated Wisconsin hunters. Both hail from the woods near Woodruff and are determined to take the truck through regardless. Reports filed nightly by the men indicate that while the roads are in terrible condition, they are able to average seventy miles per day. They have had no trouble and expect none this side of the mountains in Tennessee.

Merit wins—that's why the CCJ is the leader

Personal Items

Wm. H. Bennett, for nearly a year advertising manager of the Searchlight Co., Chicago, has joined the forces of the Service Motor Supply Co., 15th & Michigan Ave., Chicago. This action was occasioned by the consolidation of the Searchlight Co. with the Air Reduction Co., New York City, and the removal of the Searchlight interests to New York.

Frederick Erickson, formerly factory manager of the United States Motors Co., of Grand Rapids, Mich., has become chief engineer of that concern.

Arthur C. Gross, formerly with the Bergdoll Motor Car Co., Philadelphia, and the Flint Motor Wagon Co., of Flint, Mich., has become service representative of the United Motors Co., of Grand Rapids, Mich., with headquarters in New York.

Henry Lansdale has become manager of the carriage sales department, and Frank C. Kip, manager of the new department of carriage sales promotion of the Packard Motor Car Co.



MATT. R. KORSHIN

Sales manager for the Atterbury Motor Car Company, has been placed in charge of the eastern half of New York and Pennsylvania, and all of New Jersey, in addition to the New England territory. He will also cover these new territories as district sales manager.

Walter H. Lumpkins, who has been associated with the Silveco Co., of Bethlehem, Pa., for several years, has become advertising manager. He immediately took charge of the national advertising campaign on Bethlehem spark plugs now running.

J. Malcom, for many years connected with the Stearns-Knight Boston branch, has joined the Van Cortlandt Vehicle Corp., New York City.

A. E. Morrison, for the past four years special representative of the Maxwell Motor Co., Detroit, has resigned that position to become western sales manager for the Rainier Motor Corp., with headquarters in San Francisco.

William Nantarro, formerly of J. M. Quinby & Co., Newark, N. J., has been appointed superintendent of the body building department of the Kent Motors Corp. factory, Newark, N. J.

F. N. G. Kranich has been chosen to head the agricultural machinery department of the Hyatt Roller Bearing Co.

C. P. Robinson, for the last three years with the Cadillac Automobile Co., Boston, Mass., has joined the city sales force of the Van Cortlandt Vehicle Corp., New York City.

W. T. Shively, well known in New York and Brooklyn, has joined the Van Cortlandt Vehicle Corp., 63d & Broadway, New York City.

A. R. Thomas, of Detroit, Mich., has become special sales representative of the Fulton Motor Truck Co., of Farmingdale, L. I., and will make his headquarters in that city.

Ernest L. Ferguson, connected with the touring and roads departments of the American Automobile Association, recently dropped dead at the office of the A. A. A. in Washington.

H. A. C. Fay has become general manager of Frank G. Robins, Inc., of Hartford, Conn., distributor for Saxon cars, the Autocar, and Avery plows. He retains his position as New England district manager of the Service Recorder Co., of Cleveland, the headquarters of which have been moved to Hartford.

H. R. Williams has become engineer and manager of the Detroit office of the Klaxon Co., Newark, N. J., manufacturer of the Klaxon warning signals. Mr. Williams is a member of the S. A. E. and several other engineering organizations. He was connected with the Westinghouse Co. for several years, and more recently was manager of the Gibson Co. at Indianapolis. He comes to the Klaxon Co. from the Chanslor & Lyons Co. of the Pacific coast.

New Truck Agencies

Geo. D. Fox, 217 York St., Hartford, Conn., has opened a branch in New Haven for the sales of Peerless cars and trucks.

J. W. McCarthy, Lawrence, Mass., has taken the agency for Republic trucks.

Pacific Kissel Kar Branch, Portland, Ore., has taken the agency for Federal trucks.

Stegeman Truck Co. of New England has been organized with headquarters at 15 Jersey St., as agency for Stegeman trucks.

S. O. Carlson, 1417 Seventh St., Rockford, Ill., has taken the agency for the Vim 1000-lb. delivery truck.

Ogden, Utah. The King Eight Auto Co. has taken the agency for the Kelly-Springfield truck.

Morritz-Mullin Co., dealer in Signal trucks, formerly located at 650 Woodward Ave., Detroit, has moved to larger place at 1210 Cass Ave.

Rainier trucks have been taken on by the following: W. W. Barnett, Denver; Reliance Automobile Co., San Francisco; Greer-Robbins Co., Los Angeles; Paige Motor Sales Co., Seattle; Jones Motor Co., Pittsburgh; Lexington Motors Chicago Co., Chicago; M. G. Bernin, New Orleans, and the Motor Sales Co., Baltimore.

Milwaukee Machine Tool Co., Milwaukee, Wis., has sold its plant and gasoline engine business to the Le Roi Co., incorporated under the laws of Wisconsin with \$350,000, which will devote its attention exclusively to the manufacture of a four- and six-cylinder engine for light commercial and pleasure cars and light tractors. The officers are: Chas. W. Pendock, president and general manager; J. Roy Frantz, vice-president, and Norman Christiansen, secretary-treasurer.

J. C. Wilson Co., Detroit, has brought out an improved dump body which will meet the requirements of contractors and building material men. The side rocking gravity discharge principle is employed, requiring but one man to operate it. The point of discharge is 2 ft. outside the wheels of the motor truck, in this way avoiding any obstructions in maneuvering the truck after the load has been discharged.

New Incorporations

A-B-F Economizer Co. has been incorporated in Wilmington, Del., with a capital of \$300,000, to manufacture motor cars, road and farm tractors.

Biggam Trailer Corp., Dover, Del., has been incorporated with \$200,000 capital, to manufacture automobiles, motor trucks and tractor trailers.

Double Drive Motor Co., of Kansas City, Mo., has been incorporated with a capital of \$500,000, to build and deal in automobiles, tractors and motor vehicles of all kinds. The incorporators are Theodore Ditmars, Walter Beck and S. B. Gatewood.

Globe Motor Truck Co., 420 Victoria Bldg., St. Louis, Mo., has been incorporated with \$200,000 capital. F. M. Woodward is manager. The factory is to be located at E. St. Louis, Ill.

Martin Truck & Body Corp. has been incorporated in Albany, N. Y., with a working stock of \$450,000, to manufacture automobiles, trucks, etc. Incorporators are H. S. Perrigo, S. C. T. Dodd and H. Thompson.

Mountain Motors Co. has been incorporated in Denver, Col., with a capital of \$50,000, to handle Packard pleasure cars and trucks.

Factory News

Selden Motor Truck Co., Rochester, N. Y., is erecting additional factory buildings which will cover 14,000 sq. ft.

Menominee Truck Co. & Bertless Service & Sales Co. will occupy the 2-story brick and tile garage, 50 x 135 ft., Commerce Ave. near Eulston St., Grand Rapids, Mich.

Torbensen Axle Co., Cleveland, O., is about to erect and equip a machine shop addition of 30,000 sq. ft. The contract for the building has been let, but orders for the machinery, etc., have not been placed.

Standard Metal Work Co., Thompsonville, Conn., on February 1, paid its semi-annual dividend of 3½ per cent. on preferred stock and 3½ per cent. on common, after the usual depreciation charges.

Signal Motor Truck Co. of New England, New England distributor of Signal trucks and Atlas delivery cars, has opened salesroom and service station at 949 Commonwealth Ave., Boston, Mass.

Parker Rust Proof Co. of America, Detroit, at a recent meeting of stockholders, re-elected Clark W. Parker, president, and Wyman C. Parker, secretary-treasurer and general manager. The other officers elected were J. G. Johnson, vice-president; E. C. Hoelzle, assistant treasurer; U. M. Cornelius, assistant secretary, and L. Hulbert, comptroller.

Gier Pressed Steel Co., Lansing, Mich., has increased its capital stock from \$500,000 to \$1,000,000. The following officers were elected: W. K. Prudden, president; Harry E. Bradner, vice-president; B. S. Gier, secretary and general manager, and D. F. Edwards, treasurer.

P. J. Durham, 244-50 W. 49th St., New York City, has opened a Brooklyn branch at 761 Park Place. The Durham Co. distributes all Gray & Davis products, including starting and lighting systems and automobile lamps, and has the official service station of the Electric Auto-Lite Co. The Brooklyn branch will be the distributing point for Gray & Davis starters for Fords, and will also maintain a fully equipped shop and stock room to take care of starting and lighting work. A. C. Phillips, formerly with C. T. Silver Motor Co., will be manager of the branch. He is also treasurer of the company.

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THE SOUTH AMERICAN OPPORTUNITY FOR TRUCK AND TRACTOR BUILDERS

NEVER in the history of our young republic—young in comparison with the nations of the old world, but the patriarch among the American countries—has there been a time so fraught with large possibilities as the present. Never was there so attractive an opportunity for us to take a leading place in the commerce of the world. The potentialities are quite beyond the ken of the most optimistic. The immense undeveloped resources of South America, to say nothing of those in the great western and northwestern sections of this continent—both agricultural and mineral—are offering themselves. And never before have we been in so favorable a situation to undertake the development of these fields. Competition from the older nations has been very largely removed by the great war and we are stronger than ever financially to prosecute work of the kind.

Make your product pay—advertise in the CCJ

With all that it means to industries of all kinds, it means as much or more to the makers and dealers in self-propelled means of transportation and farming machinery. The great distances over which material must be carried, the vast areas for cultivation that horse and man unaided by mechanical motive power could not begin to cope with, and the extent of the ranches and ranges that could not be covered on horseback by those superintending the work—all demand automotive machinery.

Now is the time for us to corral this business that, to the limited extent that it was formerly engaged in, was monopolized by the enterprising European countries. Our financial authorities are working out the one big problem of credits and banking relations. To avoid losing their big chance, our car and tractor builders must be ready to fill the orders when the demand comes, for the promoters of this pioneer developing work will not be willing to wait.

WHAT GOOD ROADS MEAN IN OPERATING ECONOMY TO CAR USERS

IN another part of this issue will be found an abstract of the report of a series of tests carried on at the Massachusetts Institute of Technology to determine the tractive force, exclusive of losses internal to the vehicle, required to propel at constant speed a certain delivery wagon on different urban roads. The results obtained indicate the importance of constructing and maintaining smooth, hard and clean roads from the point of view of tractive resistance. Low tractive resistance means small gasoline consumption for gasoline trucks, and a reduced electricity expense or greater daily mileage with electric trucks. It is well known that bad roads increase the cost of maintenance by the excessive wear and tear they impose on cars, but few realize how seriously they affect the straight operating cost.

TEXAS FARMERS HAVE PROSPERED AND HAVE MONEY TO SPEND

LAST year Texas led all other states in the value of its agricultural products. According to the Department of Commerce, the total crop value was \$684,851,000, an increase of 66 per cent. over 1915. Cotton alone represented more than half of this and was double the value of the cotton crop the year before.

Quoting from the Associated Press, "The value of Texas live stock as of January 1, 1917, was \$452,118,000, an increase of nearly \$14,000,000 compared with the values of one year before." Another interesting statement with regard to Texas is that it has more tillable soil awaiting the call of the plow than any other state in the Union.

These interesting statistics are given in a circular issued by an enterprising agricultural paper of that section, the *Semi-Weekly Farm News*, which has gone further and compiled some interesting figures of its own, relative to the automobile registrations in Texas. These are given by counties and show an increase in nine months of 42½ per cent.

It is very evident that Texas has money to spend and that it is spending it and the point is made that there are great possibilities for the manufacturers of farm implements,

tractors, motor trucks and automobiles. The rural districts of this state are those that have shown the greatest increase in automobile licenses.

It is rather interesting to compare the total figures, 137,807 on April 1, 1916, to 197,687 January 1, 1917. It looks as though Texas would make some of the other states take notice. Although Pennsylvania had an increase of over 50 per cent. from January 1, 1916, to January 1, 1917, its

total number of licenses issued on that date was only about 225,000.

Of course, Texas is larger, being nearly six times the area of Pennsylvania, but its population is only about one-half as great, which is a further indication that the agricultural states are offering an especially inviting field at the present time for the output of every form of motive vehicle, but of course this is especially true of the tractor.

Metal and Steel Markets

Steel Demand Again Increasing

The leading feature of the steel market continues to be the demand for ship plates. Leading makers are so fully engaged that they are unable to accept any further orders for delivery in a reasonable length of time. At the time of this writing the prospect that the United States may be engaged in hostilities with Germany has failed to unsettle the steel market.

The briskness of railroad equipment buying is one of the features of the market. Quite a little activity in structural business has been noted throughout the West.

The tremendous congestion of steel products at various Atlantic seaports, destined for the Allied countries, is expected to prove of advantage to the United States Government in its effort to hasten the production of munitions that it has contracted for over the past three months and is now seeking.

Quotations on February 10th were:

Steel Products Prices

Bessemer billets, per ton, mill.	65 00	a	....
Open hearth, per ton, mill.	65 00	a	....
Sheet bars, per ton	65 00	a	....
Forging billets, per ton, mill.	85 00	a	....

Sheets

The following prices are for 100-bundle lots and over f.o.b. mill; smaller lots are \$2 per ton higher.

Blue Annealed Sheets—	Cents per lb.
Nos. 3 to 8.....	4.00 a 4.25
Nos. 9 to 12.....	3.75 a 4.00
Nos. 13 to 16.....	3.85 a 4.10
No. 17 and lighter gauges are based on \$4.50 per 100 lbs. for No. 28 Bessemer black sheets.	

Box Annealed Sheets, Cold Rolled—

Nos. 17 to 21.....	4.30 a 4.55
Nos. 22 and 24.....	4.35 a 4.45
Nos. 25 and 26.....	4.40 a 4.65

Galvanized Sheets of Black Sheet Gauge—

Nos. 10 and 11.....	5.25 a 5.75
Nos. 12 to 14.....	5.35 a 5.85
Nos. 15 and 16.....	5.50 a 6.00
Nos. 17 to 21.....	5.65 a 6.15
Nos. 22 and 24.....	5.80 a 6.30
Nos. 25 and 26.....	5.95 a 6.45

Above prices are for Bessemer stock. For open hearth stock \$2 per ton advance is charged.

Iron and Steel at Pittsburgh

Bessemer iron, Valley furnace.	35 00	a	37 00
Bessemer steel, f.o.b. Pittsburgh	65 00	a	....
Skelp, grooved steel	3 25	a	3 40
Sheared steel skelp	3 50	a	3 60
Ferromanganese (80 per cent.), seaboard	165 00	a	....
Steel, melting scrap	22 00	a	....
Steel bars	3 25	a	....
Black sheets, 28-gauge.....	4 50	a	4 75
Galvanized sheets, 28-gauge...	6.25	a	6 75
Tank plates, 3/4 and heavier....	4 75	a	....

Prices of New Metals

Finished copper, brass and other products—Prices on lead sheets have been ad-

vanced by makers, while copper and brass products are firmer, owing to the upward movement in the primary markets. The following prices are all f.o.b. mill unless otherwise noted:

Sheet zinc	.....\$21 00a	....
Sheet aluminum, 1917 contract..	40 00a	....
do, outside market contracts.	65 00a 75 00	....
do, outside market prompt spt	70 00a 80 00	....
Aluminum wire, outside market		....
prompt shipment	80 00a100 00	....
Copper wire	39 00a	....
Sheet copper, hot rolled	42 00a	....
Sheet copper, cold rolled	43 00a	....
Copper in rolls	42 00a	....
High brass sheet	38 50a 44 00	....
High brass wire and light rods.	38 50a 44 00	....
High brass heavy rods	36 50a	....
Low brass sheet, wire and rods	41 00a 46 00	....
Bronze sheet, wire and rods....	43 25a 46 00	....
Brazed brass tubing	46 00a 48 00	....
Brazed bronze tubing	48 00a	....
Seamless copper tubing	46 00a 48 00	....
Seamless brass tubing	44 00a 46 00	....
Seamless bronze tubing	46 00a 48 00	....
Full lead sheets	10 25a	....
Cut lead sheets	10 50a	....

Prices of Old Metals

Demand for light and bottoms copper is fair. The market is firm, with sellers expecting higher prices.

Cents per pound

	Buying.	Selling.
Copper—		
Heavy cut & crucible	28.00a29.00	30.50 a31.00
Heavy and wire..	26.00a26.50	28.00 a28.50
Light & bottoms.	22.00a23.00	24.00 a25.00
Heavy mach. comp.	21.00a22.00	23.50 a24.50
Brass, heavy	15.25a16.00	17.00 a18.00
Brass, light	12.00a13.00	13.50 a14.30
Lead, heavy	7.00a 7.25	7.62½a 7.75
Tea lead	6.25a 6.37½	6.62½a 6.75
Zinc scrap	7.50a 8.00	8.50 a 9.00

The buying prices are those which the larger dealers will pay; the selling prices are market quotations.

Rubber Prices Higher

Since our last writing rubber has advanced considerably in price. The most noticeable advance was made from February 2 on. Within the week preceding this writing dealers have been buying freely while manufacturers take but little.

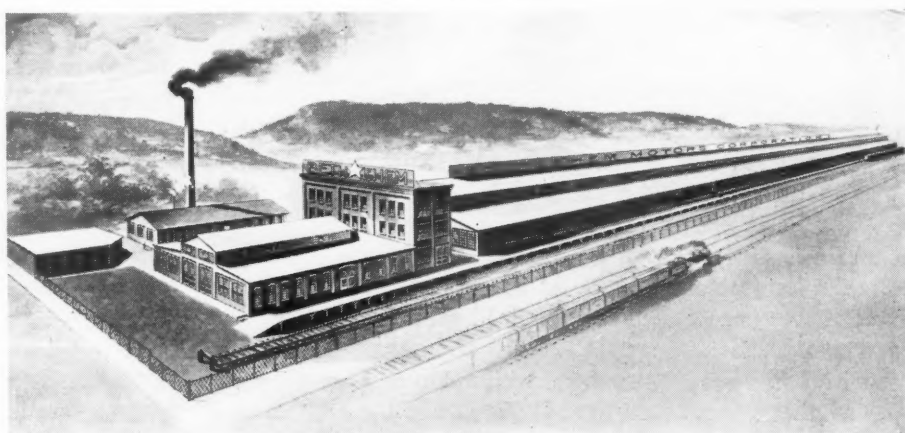
Para—Up-river, fine, per lb.....	86 a	..
Up-river, coarse	57 a	..
Island, fine	80 a	..
Island, coarse	36 a	..
Caucho, ball, upper	55½a	..
Caucho, ball, lower	51 a	..
Cameta	40 a	..
Ceylon—First latex, pale crepe...	.. a	92
Brown crepe, thin, clean	81 a	83
Smoked, ribbed sheets	.. a	93
Centrals—Corinto	.. a	55
Esmeralda	.. a	54
Quayule	41 a	..
Balata, sheets	83 a	84
Balata, block	66 a	68
Mexican—Scrap	.. a	52
Frontera	.. a	52
African—Massai, red	64 a	..

Domestic Scrap Rubber

Tires—Automobile	6½a	..
Bicycles, pneumatic	4½a	..
Inner tubes, No. 1.	25 a	..
Inner tubes, No. 2.	11¼a	..
Red	11¼a	..

MARTIN TRUCK & BODY ACQUIRES MARTIN CARRIAGE

The recently formed Martin Truck & Body Co. has taken over the Martin Carriage Works, York, Pa. This carriage company has been in existence for 30 years and two or three years ago branched out into the manufacture of commercial bodies and small trucks for the lower priced automobile chassis.



Enormous Factory of the Bethlehem Motors Corporation

This is the plant of the Bethlehem Motors Corporation, of Bethlehem, Pa., in which will be built 10,000 trucks the next year. It has 130,000 sq. ft. of floor space and occupies 20 acres of flat land on the Central Railroad of New Jersey. It expects to produce one and a quarter and two and a quarter ton trucks.

For its readers—information; for its advertisers—results. That's the purpose of the CCJ

Activities of the Motor Truck Association of Philadelphia

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COMMERCIAL CAR JOURNAL OFFICIAL ORGAN

MOTOR TRUCK ASSOCIATION INSTALLS NEW OFFICERS

At the January meeting of the Motor Truck Association the new officers, O. W. Doolittle, president; H. M. Coale, vice-president; J. D. Howley, treasurer; W. H. Metcalf, secretary, were introduced.

The annual reports of the secretary and treasurer were read. Written reports of the Legal, Entertainment, Membership, Good Roads, Traffic, Publicity and Reception committees were read, showing the work done during the past year by these committees.

The retiring president, Lee J. Eastman, was presented with a beautiful mahogany electric standing lamp.

Forty-eight new members were elected.

Former Member's Inspirational Talk

The speaker of the evening was George M. Graham, of the Willys-Overland Co., Toledo, O. The impressions which Mr. Graham has gained since his transition from news writer to automobile business man were well set forth in the interesting talk which he delivered. He laid particular emphasis upon the painstaking efforts of the manufacturers to give the purchasing public a good product and expressed his entire faith in the integrity and reliability of the motor car manufacturers. "One of the first things that impressed me," said Mr. Graham, "was the genuineness of the effort on the part of the automobile manufacturer to serve the public. One of the strongest principles of the business seems to be the desire of the manufacturing company to give the purchaser a fair break for the money he puts up. This is noticeable in the purchasing of materials and in the work of the laboratory, where day after day efforts are carried on to improve little features that will add to the life and service of the car. Every man in the business should fully understand the straightforward effort to put out a better product each year. Of course lively competition in the auto trade is an incentive, and you will find that manufacturers who relax in their efforts in this respect fall behind in their appeal to the public."

Secretary on Membership Advantages

He was followed by W. H. Metcalf, who said: "During the past three years the Motor Truck Association of Philadelphia, which is composed of motor truck dealers, solid tire dealers, motor truck body builders, their salesmen and newspaper men, has proved how valuable an association that really does things can be to its members. The association has now established a membership for owners and superintendents of deliveries. There are over twelve hundred

owners of motor trucks in Philadelphia; every one of them should be a member of the association for the following ten reasons:

"First: The objects of the association are to advance the interests of the motor truck industry, and to promote and further the use of commercial motor vehicles.

"Second: The semi-monthly meetings of the Board of Governors enable them to keep in close touch with the requirements of the organization and direct it accordingly.

"Third: The monthly meetings of the association, which are held on the third Wednesday of every month at the Hotel Adelphia, are worth attending. At each monthly meeting a prominent man in the industry or allied industries gives his views to the association, and at these meetings general discussions are held in which every member is asked to participate.

"Fourth: The association maintains a general information bureau at the secretary's office, 328 North Broad St., where copies of the automobile laws of Pennsylvania and adjoining States are on file. Also lists of Pennsylvania motor vehicle registrations and license numbers. Catalogues of all the gas and electric motor trucks manufactured in the United States are also on file, and we have many other sources of information that an individual dealer or owner would not have.

"Fifth: The association has an attorney who answers the many legal questions that our members ask continually. If a member is in doubt about any motor law that involves a legal question, he telephones the association. This service does not supplant their own attorney, but there are many little things that come up daily which are handled through our attorney. He represents our members and their employees in court for violations of motor vehicle laws and assists in making our legal documents.

"Sixth: The association is about to establish an employment department through which it will assist owner members to secure good drivers and mechanics; references and qualifications will be investigated by the association before the name of the drivers or mechanics are placed on the eligible list.

"Seventh: The association has seven active committees—Legal, Good Roads, Membership, Traffic, Entertainment, Reception and Publicity, thus dividing up the work of the association among a large number of its members. These committees have accomplished a great deal of good for the benefit of the members of the association during the past three years.

"Eighth: It costs an owner or superintendent but \$5.00 to join and annual dues

of \$5.00. A certificate of membership is issued in the name of the firm and a membership card is issued to the individual who represents his firm in the association. In addition to this, each member receives monthly the 'Commercial Car Journal,' which magazine is the official organ of the association and publishes all the association news.

"Ninth: An owner or superintendent need have no hesitancy in joining the M. T. A. and attending the meetings, as it is an absolute rule that no dealer or salesman will solicit business from an owner or superintendent who may attend the meetings of the association.

"Tenth: The Motor Truck Association is not an incorporated organization, therefore it is perfectly legal for incorporated companies to join this association. Owner members assume no financial obligations of any kind except the admission fee and annual dues.

"If these ten reasons have not convinced you that you should become a member of the Motor Truck Association, you ought to write to the secretary and he could readily furnish you fifty more good reasons why an owner or superintendent of delivery should be a member of the M. T. A."

E. V. A's Part in Program

The meeting was then turned over to R. L. Lloyd, president of the Electric Vehicle Association, whose members were meeting with the Motor Truck Association. Mr. Lloyd introduced Mr. Mansfield, of Boston, chairman of the national E. V. A.; he told of the work being done by the Electric Vehicle Association throughout the country.

He was followed by Rodney K. Merrick, of Philadelphia, who gave an illustrated talk on the uses and misuses of electric vehicles. During his talk a number of moving picture films pertaining to motor trucks and electric vehicle industry were shown.

There were over one hundred members and guests present.

CONVENTION OF GARFORD SALESMEN

Garford Motor Truck Co., of Lima, Ohio, has just closed its annual convention of salesmen, held at the company's plant. Fifty representatives from all parts of the country attended the meeting and brought enthusiastic reports of 1916 sales, and optimistic prospects for 1917. The company is planning to double its output during the next year.

Why is the CCJ the only truck paper a member of the Audit Bureau of Circulations? Here's food for thought

CCJ GALLERY of SALES MANAGERS

ROYER NEWTON SKILLMAN
SALES MANAGER
THE PACKARD ELECTRIC
COMPANY
WARREN OHIO.

ALL DRESSED UP AND NO PLACE^s TO GO.

W. E. FERRIS
SALES MANAGER
OHIO TRAILER COMPANY
CLEVELAND, OHIO.

BILL IS CERTAIN THIS TRAILER HAS MORE GOOD POINTS THAN ANY THING KNOWN

O. D. SHONNARD
SALES MANAGER
UNION TRUCK MFG. CO. INC.
NEW YORK.

THE FIELD IS NEVER TOO LARGE FOR HIM TO COVER

P. K. HEXTER
SALES MANAGER
DAY-ELDER MOTORS
CORPORATION
NEWARK N. J.

HE IS KEEPING A TRUE COURSE TO SUCCESS.

E. W. CORMAN
SALES MANAGER
DENNEEN MOTOR CO.
CLEVELAND OHIO.

THE TRUCK HE SELLS HAS NOTHING TO DO WITH THE TRUCK HE USE TO WRITE

S. M. WILLIAMS
SALES MANAGER
GARFORD MOTOR TRUCK
COMPANY
LIMA, OHIO.

HE IS PAVING THE WAY FOR BETTER ROADS EVERYWHERE

Advertising appropriations bring greatest returns when expended in the CCJ

Buyers' Information

Commercial Car Review

(Western Section)

On the following pages is given a complete review of the Commercial Car Models which will be manufactured for the coming season by Western American Manufacturers.

See Complete Indexes on Pages 38 and 39

THIS is the second or Western Section of the Review, and includes cars manufactured in the following States: California, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Oregon, Texas, Washington and Wisconsin.

The first or Eastern Section of the Review was published in January, and included cars manufactured in the following States: Connecticut, Delaware, District of Columbia, Georgia, Kentucky, Maryland, Massachusetts, New York, New Hampshire, New Jersey, North Carolina, Ohio and Pennsylvania.

The data given in this Review was supplied direct by the makers, and is as correct as can be obtained up to the date of publication.

Key to Abbreviations will be found on the leaf attached to this page; when this is opened out it will be found very convenient to refer to, no matter which pages of the Review are consulted. Indexes will be found on pages 38 and 39.

Criticisms and Suggestions on this Buyers' Information Review are invited. We want to know whether it meets requirements and how it can be made better, if possible.

Horse Power.---All horse powers are calculated by the S. A. E. formula: $H. P. = \frac{D^2 N}{25}$, where D = bore in inches and N = number of cylinders.

On the other side of this leaf will be found the key to the abbreviations used in the

*Buyers' Information
Commercial
Car Review*

While consulting the Review, turn this leaf out so that it extends beyond the book, it will then be convenient for reference, no matter how many pages you turn to.

Indexes arranged alphabetically and according to price are on pages 38 and 39.

KEY OF ABBREVIATIONS

USED IN THE

Annual Commercial Car Review

Capacity: In pounds. 2000 lbs.=1 ton.

Chassis Weight: In pounds.

Price: In tables, the prices are for chassis only, unless marked with an asterisk (*), in which case this shows complete car price.

In captions, prices are for car complete as shown in illustration, unless marked with (X), in which case it indicates chassis price.

Engine: O, own make; A, Falls; B, Buda; C, Continental; D, Hercules; E, Light Mfg. & Foundry Co.; F, Ferro; G, Golden, Belknap & Swartz; H, Herschell-Spillman; I, Massnick-Phipps; K, Knight; L, LeRoi; M, Emerson Engineering Co.; N, Northway; P, Pruch; Q, Teetor; R, Rutenber; S, Wisconsin; T, Sterling; U, Waukesha; V, Beaver; W, Wiedley; X, Somner; Y, Lycoming; Z, North American Motors Co.

Horse Power: Calculated by S. A. E. formula, $H. P. = \frac{D^3 N}{2.5}$; D=bore in inches, N=number of cylinders.

Motors are 4 cylinders unless H. P. is preceded by an asterisk (*), which indicates 2-cycle.

Cylinders Cast: S, single; P, pairs; B, en bloc.

How Cooled: A, air; C, centrifugal pump; G, gear pump; T, thermo-syphon; W, water.

Radiator: C, cellular; H, honeycomb; T, tubular; V, vertical.

Carburetor: A, AWT; AU, automatic; BL, ball; C, Carter; E, Ensign; EX, Excelsior; F, Flechter; G, Gem; H, Holley; HA, Hartmen; HN, H. & N.; J, Johnson; K, Kingston; KD, K. D.; LG, Longuemare; M, Marvel; MS, Master; MY, Mayer; N, Newcomb; O, own make; P, optional; R, Rayfield; RB, Richenbach; S, Stewart; SB, Stromberg; SH, Shakespeare; SL, Schebler; SP, special; T, Tillotson; Z, Zenith.

Ignition, Type: B, battery; D, distributor; M, magneto.

Ignition, Make: A, Atwater Kent; AL, Auto-Lite; AM, American Battery; B, Bosch; BL, Berling; BR, Briggs; C, Connecticut; D, Delco; DX, Dixie; E, Eisemann; G, Gray & Davis; H, Heinze; K, Kingston; M, Mea; MY, Mayer; N, National; P, optional; R, Remy; S, Simms; SD, Splitdorf; U, U. & H.; WS, Westinghouse.

Spark-Plug Size: S, S. A. E.; $\frac{1}{8}$, $\frac{1}{2}$ -inch pipe; M, Metric. Spark-Plug Sizes, S. A. E., $\frac{1}{8}$ -inch diameter, 18 threads straight. $\frac{1}{2}$ -in pipe, size, $\frac{1}{8}$ -in. diameter, 14 threads, tapered.

Lubrication: F, force feed; G, gravity; S, splash feed.

Clutch: B, band; C, cone; D, disc; I, individual clutch; U, unit control.

Drive: B, bevel gear; C, chain; CT, concentric spur; F, friction; I, internal gear; O, own; R, roller; S, shaft; SP, spur; W, worm.

Transmission: O, own make; A, Cotta; B, Brown-Lipe; C, Covert; D, Detroit; E, Mechanics Machine Co.; F, Fuller; G, Grant-Lees; I, individual clutch; L, planetary; M, magnetic; N, Northway; P, progressive; Q, friction; R, Rockford; S, selective; T, Motor Machines; U, Muncie; V, Lefever Arms; W, Warner; Z, Entz.

Rear Axle: O, own make; A, American Ball Bearing Co.; B, Torbensen; C, Columbia; CL, Cleveland; D, Detroit; E, Weston-Mott; F, floating; G, American Gear & Mfg. Co.; H, Hess; I, Empire; J, Gemeo; L, Salisbury; M, Mott; N, Sheldon; P, Peru; Q, dead; R, Celfor; S, semi-floating; T, Timken; U, Russel; W, Walker-Weiss; $\frac{3}{4}$, $\frac{3}{4}$ -floating; $\frac{1}{2}$, $\frac{1}{2}$ -floating.

Tires: Tires are solid unless otherwise stated—*, pneumatic; C, cushion; D, dual; T, triple; S, steel.

Driver's Seat: R, right; L, left; O, optional.

Brake and Gear-Lever Location: C, center; R, right.

Engine Starter: A, Apple; AC, Allis-Chalmers; AL, Auto-Lite; AR, air; B, Bosch; BJ, Bijur; D, Delco; DS, Disco; DT, Detroit; DY, Dyneto; E, Electric; GD, Gray & Davis; H, Heinze; LN, Leece-Neville; NE, Northeast; O, own make; P, optional; R, Remy; SD, Splitdorf; SH, Simms-Huff; U, U. S. L.; WG, Wagner; WL, Ward-Leonard; WS, Westinghouse; X, extra; Z, Entz; 1, single unit; 2, double unit.

ADDITIONAL ABBREVIATIONS USED ON ELECTRICS

Battery: E, Exide; ED, Edison; G, Gould; O, own make; OP, optional; P, Philadelphia.

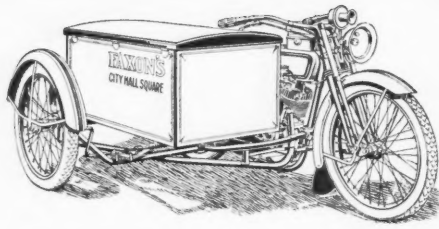
Motor: WS, Westinghouse; O, own; WG, Wagner; GE, General Electric.

Controller: CH, Cutler-Hammer; GE, General Electric; O, own; WG, Wagner; B, barrel; WS, Westinghouse.

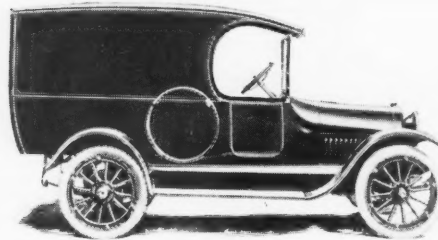
Steering Gear: V, lever; O, own.

Indexes arranged alphabetically and according to price, are on pages 38 and 39

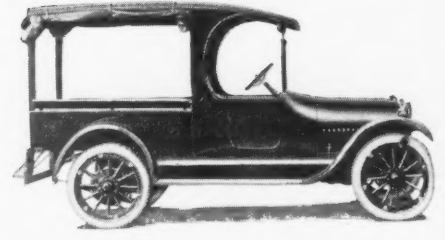
LAST HALF OF REVIEW. FIRST HALF WAS IN THE JANUARY ISSUE



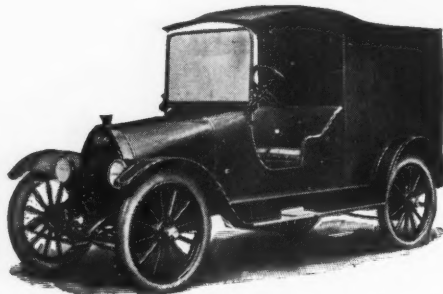
Harley-Davidson Model 16JM, 500-lb. Box Body, \$380.



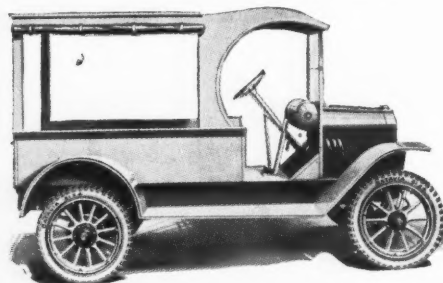
Studebaker Model SF-4-40, 1000-lb. Panel, Chassis, \$850.
Also Covered Flareboard Body.



Studebaker Model SF-4-40, 1000-lb. Covered Flareboard, Chassis, \$850.
Also Panel Body.



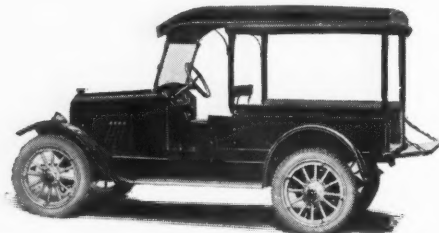
Packet 600-lb. Panel, \$395.
Also Stake, \$370; Flareboard, \$370; Screen Side Express, \$395; Covered Flareboard, \$395.



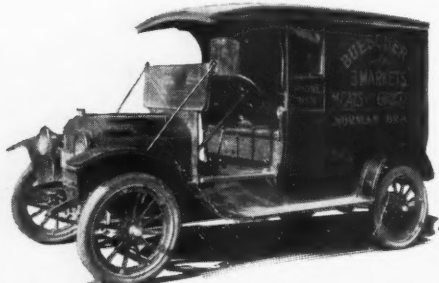
Corliss 1000-lb. Covered Flareboard, \$650.
Also Panel, \$695; Screen Side Express, \$650.



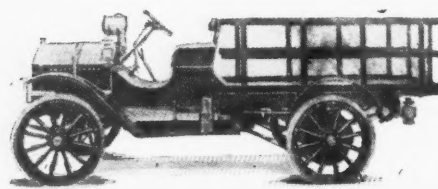
Inter-State 800-lb. De Luxe Panel Delivery, \$850.



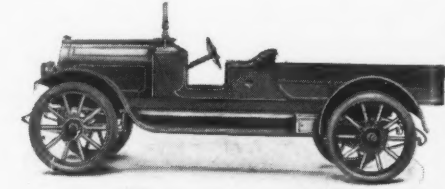
Briscoe Model B-4-24, 750-lb. Covered Flareboard, \$700.
Also Panel, \$725.



Ellsworth Model 25-A, 1000-lb. Panel.
Also Stake, \$695; Flareboard, \$695.
Made by Mills-Ellsworth Co.



Lambert Model V1, 1000-lb. Stake, \$950.
Also Open Flareboard, \$1200.
Made by Buckeye Mfg. Co.



Dispatch Model C, 1500-lb. Flareboard, \$1135.
Also Panel, \$1210.

500 Pound Gasoline

Model	Chassis Weight	Chassis Price	Engine Make	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Radiator	Carburetor	Ignition Type	Ignition Make
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16J	320	O	9	2	3.5	3.5	S	A	..	SL	M	R
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600 Pound Gasoline

Packet	800	325	P	12	4	2.75	4	B	T	..	C	B	A
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750 Pound Gasoline

B-4-24	O	16	4	3.22	5.12	B	T	H	AU	D	C
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800 Pound Gasoline

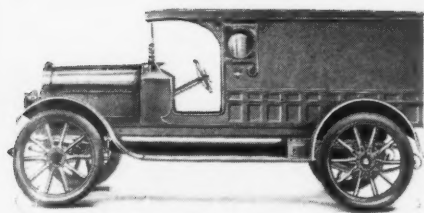
.....	O	20	4	3.5	5	B	T	H	SL	B	R
.....	O	21	4	3.62	4.5	B	T	T	KD	M	S

1000 Pound Gasoline

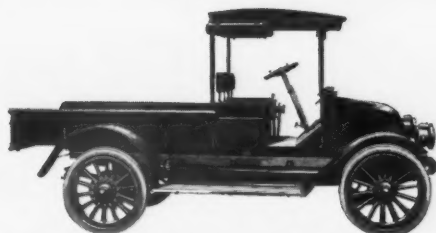
Lambert V1	2250	900	G	23	4	3.75	4.25	P	C	V	EX	M	B
Champion	1750	695	O	29	4	3.25	4.5	..	..	..	O	B	..
Express	1650	....	L	16	4	3.12	4.5	B	T	T	SL	M	EX
25A	1740	695	Y	17	4	3.25	5	B	T	V	C	B	AM
A	2360	850	C	20	4	3.5	5	B	..	H	SB	M	B
SF	....	850	O	24	4	3.87	5	B	C	T	SL	M	R
Sheridan	1200	1490	I	16	4	3.12	4	B	T	C	C	M	B

1500 Pound Gasoline

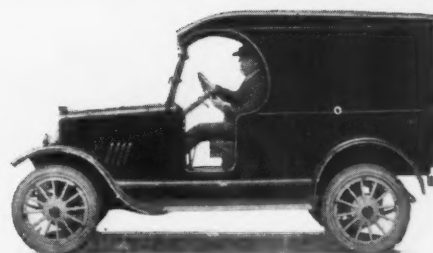
Lambert V-2	2650	1125	G	23	4	3.75	4.25	P	C	V	EX	M	B
M	2200	875	C	20	4	3.5	5	B	T	T	Z	M	E
BB	3085	1200	B	20	4	3.5	5.12	B	T	H	SB	M	E
C	2000	1100	S	23	4	3.75	5	B	T	H	R	M	B
E	....	....	B	20	4	3.5	5.12	B	C	..	SB	M	E
15	2510	1150	C	20	4	3.5	5	B	C	T	M	M	E
H	2880	1225	O	20	4	3.5	5.25	B	C	T	H	M	B
AA	3500	1600	C	24	4	3.75	5	B	T	T	SL	M	B
AA	3500	1600	C	24	4	3.75	5	B	T	T	SL	M	B
AA	3500	1600	C	24	4	3.75	5	B	T	T	SL	M	B



Dispatch Model C, 1500-lb. Panel, \$1210.
Also Flareboard, \$1135.



International Model H, 1500-lb. Flareboard,
Chassis, \$1225.
Made by International Harvester Corp.



Briscoe Model B-4-24, 750-lb. Panel, \$725.
Also Covered Flareboard, \$700.

Commercial Car

Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Rear Axles	Front Tires	Rear Tires	Driver's Seat	Brake and Gear Lever Location	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
..	F	D	C	Harley-Davidson Motor Co., Milwaukee, Wis.	P 3	..	28x3*	28x3*	..	..	58	..	60

Commercial Car

1/2	F	..	C	Packet Motor Car Mfg. Co., Minneapolis, Minn.	Q 3	Q	28x3*	28x3*	L	L	100	..	65
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Commercial Car

S	F	C	B	Briscoe Motor Corp., Jackson, Mich.	S 3	F	31x4	31x4	L	C	104	SD	50
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Commercial Cars

S	S	C	B	Inter-State Motor Co., Muncie, Ind.	W 3	F	33x4*	33x4*	L	C	110	R	90
S	S	C	B	Maxwell Motor Co., Detroit, Mich.	O 3	O	30x3 1/2*	30x3 1/2*	L	C	103	SH	..

Commercial Cars

S	S	..	C	Buckeye Mfg. Co., Anderson, Ind.	Q 1000	Q	30x3 1/2	31x4	R	R	106	..	..
S	..	..	..	Champion Motor Car Co., Fulton, Ill.	O 3	O	31x4*	31x4*	L	C	106	WS	..
S	F	D	B	Corliss Motor Truck Co., Corliss, Wis.	C 3	J	31x4*	31x4*	L	C	100	AC	..
S	F	C	B	Mills-Ellsworth Co., Keokuk, Ia.	G 3	J	30x3 1/2*	30x3 1/2*	L	C	108	A	..
S	F	D	B	Jos. W. Moon Buggy Co., St. Louis, Mo.	D 3	U	33x4*	33x4*	L	C	112	..	..
1/2	S	C	B	Studebaker Corp. of America, Detroit, Mich.	O 3	O	35x4 1/2*	35x4 1/2*	L	C	112	WG	..
M	..	D	B	Sheridan Commercial Car Co., Chicago, Ill.	D 3	F	31x3 1/2*	31x3 1/2*	R	C	104	..	..

Commercial Cars

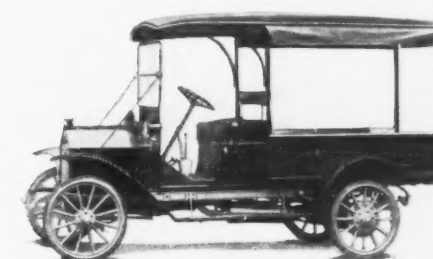
S	S	..	C	Buckeye Mfg. Co., Anderson, Ind.	Q 1000	Q	33x4	33x4 1/2	R	R	114	..	..
S	F	C	B	Commerce Motor Car Co., Detroit, Mich.	D 3	L	34x4*	34x4*	L	C	120	..	..
S	F	D	W	Dart Motor Truck Co., Waterloo, Ia.	F 3	T	34x3	34x3 1/2	L	C	124	..	..
1/2	F	..	C	Dispatch Motor Truck Co., Minneapolis, Minn.	.. 4	O	36x3 1/2*	36x3 1/2*	L	C	120	U	40
..	F	D	W	Gary Motor Truck Co., Gary, Ind.	S 3	..	36x3	36x3 1/2	L	C	118	..	..
S	F	C	B	General Motors Truck Co., Pontiac, Mich.	S 3	3	35x5*	35x5*	L	C	122	..	66 2-3
M	F	C	I	International Harvester Corp., Chicago, Ill.	S 3	O	36x3 1/2	36x4	L	C	115	B	..
S	F	D	W	Kleiber & Co., San Francisco, Cal.	B 3	F	36x3	36x4	R	C	120	..	80
S	F	D	W		B 3	F	36x3	36x4	R	C	130	..	90
S	F	D	W		B 3	F	36x3	36x4	R	C	140	..	90



Champion 1000-lb. Panel, \$750.



Sheridan 1000-lb. Covered Flareboard, \$540.
Also Stake, \$540.
Made by Sheridan Commercial Car Co.



Moon Model A, 1000-lb. Covered Flareboard,
\$1000.
Also Panel, \$1050.

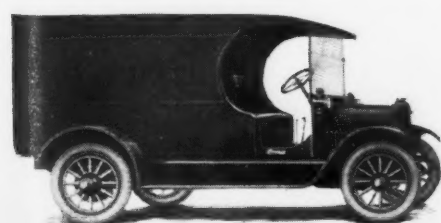


G. M. C. Model 15, 1500-lb. Screen Side Express.
Also Stake, \$1275; Flareboard, \$1225; Panel,
\$1450; Covered Flareboard, \$1265.
Made by General Motors Truck Co.

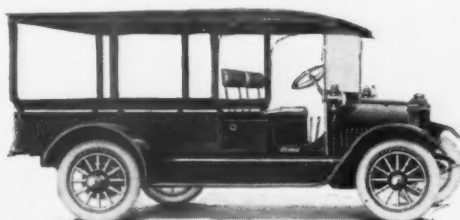
BODY DETAILS OF CARS NOT ILLUSTRATED

Dart Model BB, 1000-lb. Chassis, \$1200.
Also Stake, \$1310; Flareboard, \$1292.

Lambert Model V2, 1500-lb. Open Flareboard,
\$1200.
Made by Buckeye Mfg. Co.

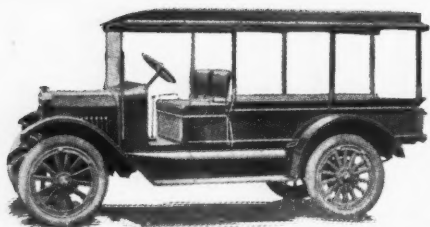


Commerce Model N, 1500-lb. Panel, \$975.
Also Flareboard, \$975; Covered Stake, \$975.

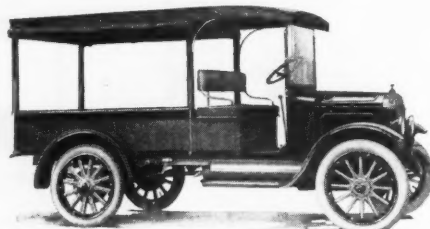


Commerce Model N, 1500-lb. Covered Flareboard,
Chassis, \$875.
Also Covered Stake, \$975; Flareboard, \$975;
Panel, \$975.

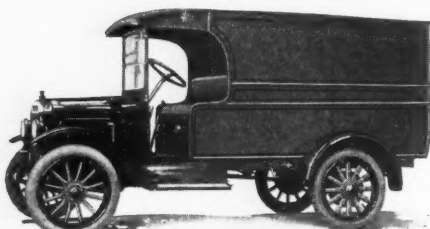
LAST HALF OF REVIEW. FIRST HALF WAS IN THE JANUARY ISSUE



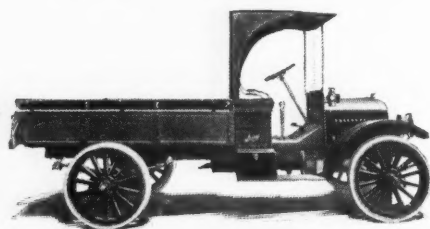
Lane Model A, 1500-lb. Covered Flareboard, \$1175.
Also Stake, \$1175; Panel, \$1195; Screen Side Express, \$1195; Flareboard, \$1150.



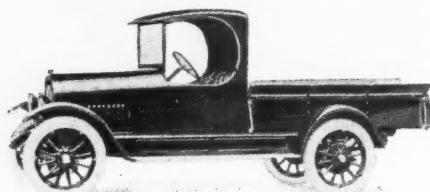
Republic Dispatch, 1500-lb. Covered Flareboard, \$750.
Also Panel, \$775.



Republic Dispatch, 1500-lb. Panel, \$775.
Also Covered Flareboard, \$750.



Gary Model E, 1500-lb. Flareboard.



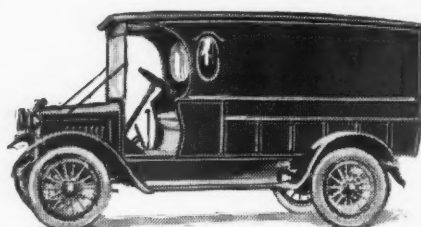
Jeffery Rapid Service, 1500-lb. Flareboard, \$1065.
Without Cab, \$1025.
Made by Nash Motors Co.



Menominee Model EW, 1500-lb. Flareboard, \$1370.
Also Stake, \$1395; Panel, \$1495; Screen Side Express, \$1495.

BODY DETAILS OF CARS NOT ILLUSTRATED
Lambert Model V 3, 1-ton Stake, \$1700.
Made By Buckeye Mfg. Co.

DI Martini Model B W, 1-ton Chassis, \$1865.
Federal Model S, 1-ton Chassis, \$1500.



Hoover Model 15-A, 1500-lb. Swell Side Panel, \$1340.
Also 6-Post Body, \$1315.



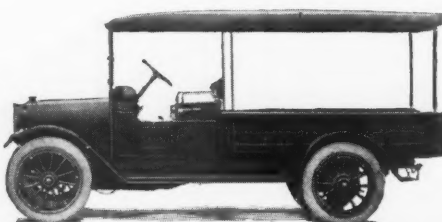
Acme Model B, 1-ton Flareboard, \$1695.
Also Stake, \$1695; Panel, \$1700; Screen Side Express, \$1830; Covered Flareboard, \$1830.
Made by Cadillac Auto Truck Co.

1500 Pound Gasoline

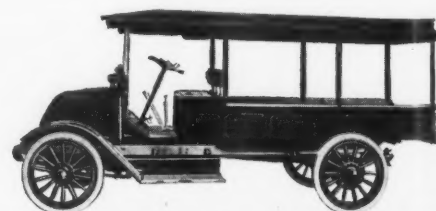
Model	Chassis Weight	Chassis Price	Engine Make	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Radiator	Carburetor	Ignition Type	Ignition Make
C1	2500	1150	B	20	4	3.5	5.12	B	T	H	..	M	..
A	2300	1075	S	17	4	3.25	5.25	B	T	T	SH	B	G
EW	3200	1295	C	23	4	3.75	5	B	T	C	SB	M	B
.....	....	1290	C	20	4	3.5	5	B	T	C	E	M	DX
Rapid Service	....	965	O	23	4	3.75	5.25	B	C	H	SB	M	..
F	2550	925	O	27	4	4.12	4.5	P	C	T	T	B	R
Dispatch	2053	....	..	20	4	3.5	5	B	T	T	M	M	B
9	....	750	O	17	4	3.25	5	B	T	C	SB	M	..

1 Ton Gasoline

1	2850	1700	C	22	4	3.75	5	B	T	C	SB	M	B
A	2700	950	C	20	4	3.5	5	B	T	C	SB	M	B
Lambert V-3	4000	1500	G	26	4	4.06	4.5	S	C	V	SL	M	R
B	3200	1575	C	20	4	3.5	5	B	T	T	R	M	E
15	2950	1500	C	20	4	3.5	5	B	T	C	SL	M	E
.....	2950	1450	C	20	4	3.5	5	B	T	C	SL	M	E
E	2600	1175	C	20	4	3.5	5	B	T	T	Z	B	R
E	3270	1850	B	23	4	3.75	5.12	B	T	H	SB	M	E
R	2750	1120	L	16	4	3.12	4.5	B	T	..	Z	M	DX
BW	3965	1865	B	20	4	3.5	5.12	B	T	T	SB	M	B
J5	....	1550	C	20	4	3.5	5	B	T	H	R	M	B
S	3500	1500	O	20	4	3.5	5.12	B	C	T	Z	M	E
A	3000	1650	C	20	4	3.5	5	B	C	T	Z	M	B
F	....	....	B	23	4	3.75	5	B	C	..	SB	M	E
21	3500	1800	C	23	4	3.75	5	B	C	T	M	M	E
F	2750	1385	C	20	4	3.5	5	B	W	C	M	M	E
F	3065	1500	O	20	4	3.5	5.25	B	C	T	H	M	B
G1	2700	1250	B	20	4	3.5	5.12	B	T	H	..	M	..
FW	3785	1575	C	23	4	3.75	5.25	B	G	C	SB	M	B
FW	3785	1575	C	23	4	3.75	5.25	B	G	C	SB	M	B



Reo Model F, 1500-lb. Covered Flareboard, \$1000.

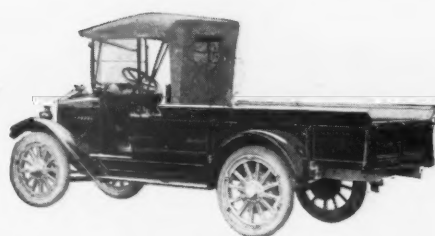


International Model F, 1-ton, Covered Flareboard, Chassis, \$1500.
Made by International Harvester Corp.

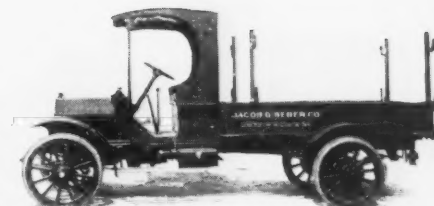
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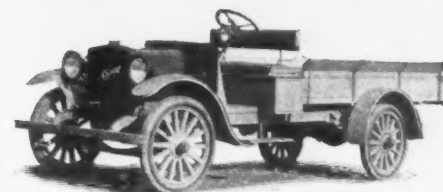
Available Model 1, 1-ton Covered Express, Chassis, \$1700.



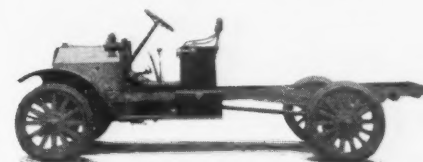
Denby Model R, 1-ton Flareboard, \$1122.



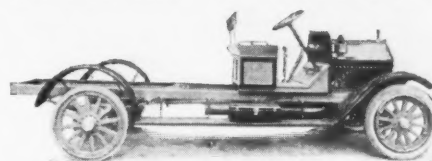
Diamond T Model J 5, 1-ton Flareboard, Chassis, \$1550.



Commerce Model E, 1-ton Flareboard, \$1235.
Also Covered Stake, \$1275.



Landshaft Model G 1, 1-ton Chassis, \$1250.



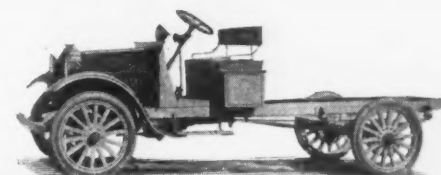
Little Giant Model 15, 1-ton Chassis, \$1500.
Made by Chicago Pneumatic Tool Co.



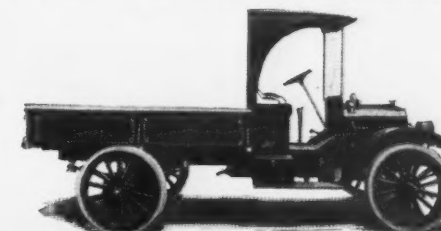
Independent Model F, 1-ton Flareboard, Chassis, \$1385.



Forschler Model A, 1-ton Flareboard, Chassis, \$1650.



Commerce Model E, 1-ton Chassis, \$1175.
Also Covered Stake, \$1275; Flareboard, \$1235.



Gary Model F, 1-ton Flareboard.

Commercial Cars

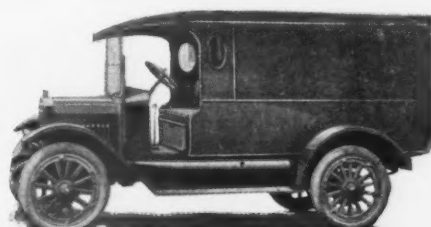
Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Rear Axles	Front Tires	Rear Tires	Driver's Seat	Brake and Gear Lever Location	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
S	S	D	I	Wm. Landshaft & Son, Chicago, Ill.									
S	S	D	W	C	3	N	34x4½	34x4½	L	C	120	..	70
S	F	D	W	S	3	F	36x4	37x5½	L	C	124	..	70
S	S	D	W	Moreland Motor Truck Co., Los Angeles, Cal.									
S	F	D	B	B	3	T	34x4½*	34x4½*	L	C	124	..	65
½	S	D	B	Nash Motors Co., Kenosha, Wis.									
S	F	D	B	S	3	S	35x4½*	35x4½*	L	C	116	BJ	75
½	S	D	B	Reo Motor Car Co., Lansing, Mich.									
S	..	D	I	O	3	O	34x4½*	34x4½*	L	C	120	R	65
S	F	D	I	Republic Motor Truck Co., Alma, Mich.									
S	..	D	I	S	3	B	32x4*	32x4*	L	C	110	B	75
S	..	D	I	S	3	B	32x4*	32x4*	L	C	110	..	..

Commercial Cars

S	S	D	W	Available Truck Co., Chicago, Ill.	S 3 F	36x3 1/2	36x4	L	C	132	..	..
1/2	S	D	I	Beck & Son, Cedar Rapids, Ia.	F 3 R	3	3 1/2	L	C	124	..	75
S	S	..	C	Buckeye Mfg. Co., Anderson, Ind.	Q 1000 Q	36x3	36x3 1/2	R	R	120	..	..
S	F	D	W	Cadillac Auto Truck Co., Cadillac, Mich.	C 3 T	36x3	36x4	R	C	128	..	75
S	F	D	W	Chicago Pneumatic Tool Co., Chicago, Ill.	B 3 T	34x4 1/2	34x3 1/2	R	C	138	..	94
S	F	D	C		.. 3 Q	34x4 1/2	34x3 1/2	R	C	138	..	94
S	F	C	I	Commerce Motor Car Co., Detroit, Mich.	D 3 B	34x3	34x4	L	C	126	R	..
S	F	D	W	Dart Motor Truck Co., Waterloo, Ia.	F 3 T	34x3 1/2	34x5	L	C	130	..	..
S	C	D	I	Denby Motor Truck Co., Detroit, Mich.	D 3 U	34x3	34x4 1/2	L	C	119	AC	74
S	S	D	W	De Martini Motors Truck Co., San Francisco, Cal.	B 3 N	36x3	36x4	L	C	145	..	90
S	S	D	W	Diamond T Motor Car Co., Chicago, Ill.	B 3 T	36x3	36x4	L	C	132	..	..
S	F	D	W	Federal Motor Truck Co., Detroit, Mich.	O 3 T	34x3	34x4	L	C	132	WS	70
S	F	D	W	Forschler Motor Truck Mfg. Co., New Orleans, La.	F 3 N	36x3	36x4	L	C	144	..	60
..	F	D	W	Gary Motor Truck Co., Gary, Ind.	S 3 ..	36x3 1/2	36x4	L	C	130	..	..
S	F	D	W	General Motors Truck Co., Pontiac, Mich.	S 3 3/4	34x3 1/2	33x5	L	C	136	..	69
S	F	D	W	Independent Motors Co., Port Huron, Mich.	S 3 F	37x3	37x4	L	C	128	..	..
M	F	C	I	International Harvester Corp.	S 3 O	36x3	36x3 1/2	L	C	128	B	..
S	S	D	I	Wm. Landshaft & Sons, Chicago, Ill.	S 3 Q	34x3 1/2	36x4	L	C	124	..	75
S	F	D	W	Menominee Motor Truck Co., Menominee, Mich.	S 3 F	36x3 1/2	36x5	L	C	130	..	70
S	F	D	W		S 3 F	36x3 1/2	36x5	L	C	144	..	70

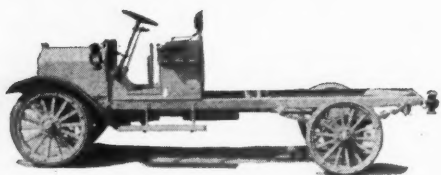


Beck Model A, 1-ton Covered Flareboard, \$1000.
Also Stake, \$1000; Flareboard, \$990; Panel, \$990;
Screen Side Express, \$990.

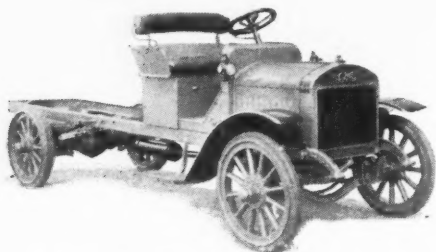


Lane Model A, 1500-lb. Panel, \$1195.
Also Stake, \$1175; Flareboard, \$1150; Screen
Side Express, \$1195; Covered Flareboard, \$1175.

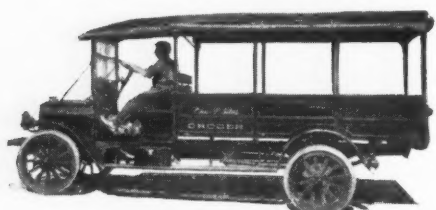
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Dart Model E, 1-ton Chassis.
Also Stake, \$1972.



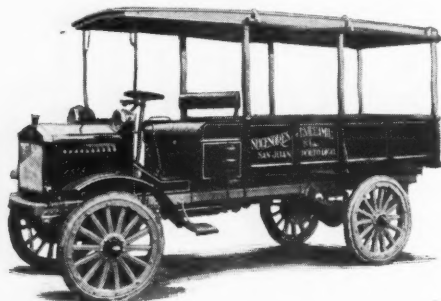
G M C Model 21, 1-ton Chassis, \$1800.
Also Stake, \$1950; Flareboard, \$1925; Panel, \$2100; Screen Side Express, \$2000; Covered Flareboard \$1975.
Made by General Motors Truck Co.



Menominee Model F W, 1-ton Covered Flareboard, Chassis, \$1575.
Also Stake, \$1700; Flareboard, \$1675; Panel, \$1800; Screen Side Express, \$1800; for 144 in. wheelbase, \$25 additional.



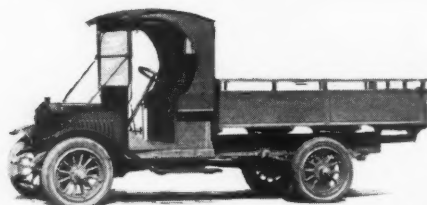
Wichita Model A, 1-ton Special Body, Chassis, \$1350.
Also Stake, \$1465; Flareboard, \$1440.



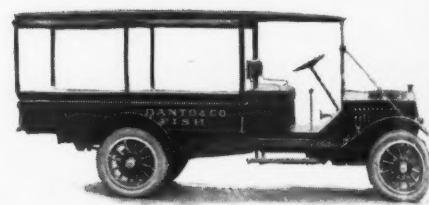
Wichita Model K, 1-ton Covered Flareboard, Chassis, \$1650.
Also Stake, \$1765; Flareboard, \$1740.



Palmer 1-ton Stake.
Made by Palmer-Meyer Motor Car Co.



Lincoln Model L 20, 1-ton Special Body, \$1075.
Also Stake, \$1075; Flareboard, \$1050; Panel, \$1075;
Screen Side Express, \$1075; Covered Flareboard, \$1075.



Lincoln Model L 20, 1-ton Covered Flareboard, \$1075.
Also Stake, \$1075; Screen Side Express, \$1075;
Covered Flareboard, \$1075.

1 Ton Gasoline

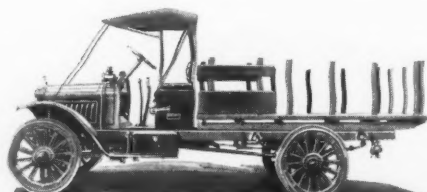
Model	Chassis Weight	Chassis Price	Engine Make	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Radiator	Carburetor	Ignition Type	Ignition Make
.....	3050	1500	C	23	4	3.75	5	B	T	C	E	M	DX
L20	2450	975	C	20	4	3.5	5	B	T	T	Z	M	DX
E1	3200	1700	C	23	4	3.75	5.25	B	C	T	R	M	B
.....	3000	....	C	23	4	3.75	5	B	T	C	SB	M	B
10	....	1095	C	20	4	3.5	5	B	T	C	SB	M	..
120	3000	1375	B	20	4	3.5	5.12	B	T	V	SB	M	B
F	3525	1550	C	23	4	3.75	5.25	B	C	T	SB	M	E
F	3525	1550	C	23	4	3.75	5.25	B	C	T	SB	M	E
F	3525	1550	C	23	4	3.75	5.25	B	C	T	SB	M	E
7	....	1200	O	24	4	3.87	5	B	C	T	SL	M	R
A	3025	1350	O	17	4	3.25	5	B	T	C	SB	M	DX
K	3350	1650	O	20	4	3.5	5	B	T	C	SB	M	DX
S	2800	....	C	23	4	3.75	5	B	T	C	R	M	SD
F	....	....	..	20	4	3.5	5	B	..	T	..	M	..
.....	....	1550	S	37	..	..	..	..	W	..	SB	M	B

1 1/4 Ton Gasoline

B	3000	1125	C	20	4	3.5	5	B	T	C	SB	M	B
1B	4316	2200	O	26	4	4	5.5	B	C	T	O	M	SD
1B	4316	2200	O	26	4	4	5.5	B	C	T	O	M	SD
.....	2800	890	..	20	4	3.5	5	B	T	T	..	M	..

1 1/2 Ton Gasoline

Lambert V-4	....	....	A	33	4	4.5	5	S	C	V	SL	M	R
H	3492	1500	B	20	4	3.5	5.12	B	T	T	SL	M	E
W-10	3000	1850	C	20	4	3.5	5	B	C	C	SB	M	E
G	3400	1575	C	20	4	3.5	5	B	T	..	SB	M	E
CW	4550	2400	B	23	4	3.75	5.5	B	C	T	SB	M	B
J4	....	2000	C	23	4	3.75	5	B	C	H	R	M	B
J4	....	2000	C	23	4	3.75	5	B	C	H	R	M	B
J	4000	1800	C	27	4	4.12	5.25	B	C	T	SB	M	E
J	4000	1800	C	27	4	4.12	5.25	B	C	T	SB	M	E
.....	3000	1650	C	20	4	3.5	5	B	C	T	Z	M	B

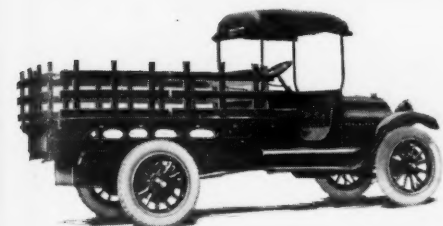


Republic Model 10, 1-ton Stake, \$1095.

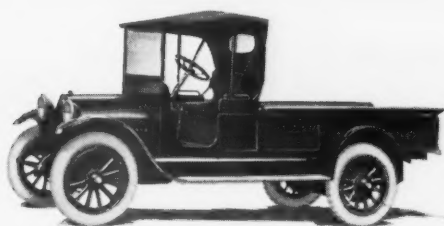


Wilcox Model S, 1-ton Covered Flareboard.

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Studebaker Model 7-4-40, 1-ton Stake, Chassis, \$1200.
Also Express Body.



Studebaker Model 7-4-40, 1-ton Express, Chassis, \$1200.
Also Stake Body.



Zeitler & Lamson, 1-ton Special Body, Chassis, \$1550.

Commercial Cars

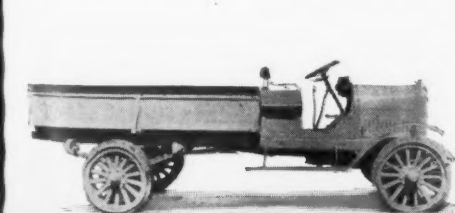
Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Rear Axles	Front Tires	Rear Tires	Driver's Seat	Brake and Gear Lever Location	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
S	S	D	W	B	3	T	34x3 1/2	34x4	R	C	126	..	65
1/2	G	C	B	S	3	L	33x5	33x5	L	C	124	D	70
S	F	D	W	N	3	T	36x3	36x4	R	C	O	WS	70
1/2	S	D	I	F	3	B	34x3 1/2	34x4	L	C	132	..	70
1/2	..	D	I	S	3	B	34x3	34x4	L	C	124	..	..
S	S	T	W	S	3	F	34x3	34x4	L	C	135	WS	66
S	S	D	W	B	3	T	34x3	36x4	L	C	120	..	70
S	S	D	W	B	3	T	34x3	36x4	L	C	144	..	70
S	S	D	W	B	3	T	34x3	36x4	L	C	168	..	70
1/2	S	C	B	O	3	O	35x5 1/2	35x5 1/2	L	C	125	WG	..
S	F	C	C	C	3	N	34x3	34x4	R	C	110	..	..
S	F	C	W	C	3	N	36x3	36x4	R	C	118	..	..
S	S	D	W	W	3	N	34x3 1/2	34x4	L	C	128	B	80
..	..	C	W	S	3	..	34x3 1/2	34x4	..	..	124	..	..
..	..	D	W	A	3	N	36x3	36x4	L	C	..	..	..

Commercial Cars

1/2	S	D	I	F	3	R	3	4	L	C	144	..	60
S	F	D	W	O	3	O	34x3 1/2	34x6	L	L	126	BJ	90
S	F	D	W	O	3	O	34x3 1/2	34x6	L	L	144	BJ	90
S	F	D	I	S	3	Q	34x3	34x3 1/2	L	C	124	..	85

Commercial Cars

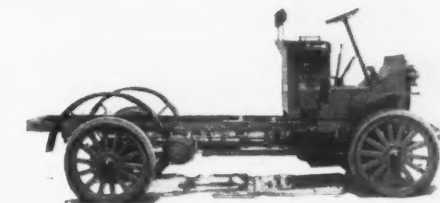
S	S	..	C	Q	1000	Q	36x3 1/2	36x4	R	R	120	..	..
S	F	D	C	C	3	N	36x3 1/2	36x4	R	C	110	..	73
1/2	F	..	W	F	3	S	..	..	L	C	120	..	75
S	F	D	I	D	3	U	35x3 1/2	35x5	L	C	120	BJ	93
S	S	D	W	B	3	N	36x3 1/2	36x6	L	C	145	..	90
S	S	D	W	B	3	T	36x3 1/2	36x5	L	C	154	..	..
S	S	D	W	B	3	T	36x3 1/2	36x5	L	C	160	..	..
S	F	C	W	C	3	T	36x3 1/2	36x5	L	C	144	WS	70
S	F	C	W	C	3	T	36x3 1/2	36x5	L	C	120	WS	70
S	F	D	W	F	3	N	36x3	34x5	L	C	144	..	60



Larrabee-Deyo 1-ton Open Flareboard, \$1550.



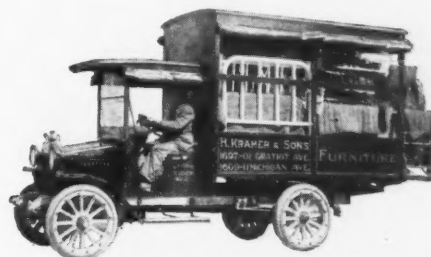
Service Model 120, 1-ton High Stake, \$1375.



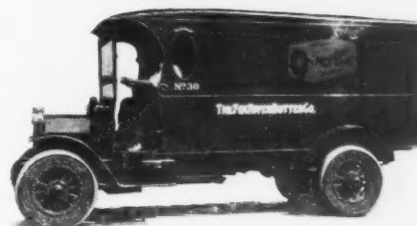
Little Giant Model H, 1 1/2-ton Chassis, \$1500.
Made by Chicago Pneumatic Tool Co.



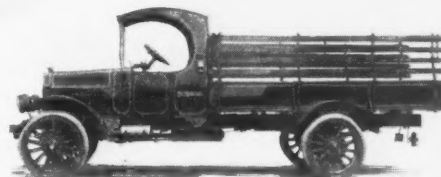
Beck Model B-1, 1/4-ton Stake, \$1200.
Also Open Flareboard, \$1175; Panel, \$1175;
Screen Side Express, \$1250; Covered Flareboard,
\$1200.



Denby Model G, 1 1/2-ton Special Body, \$1575.



Federal Model M, 1 1/2-ton Panel, Chassis, \$1800.



Di Martini Model C W, 1 1/2-ton Slat Side Flareboard, Chassis, \$2400.

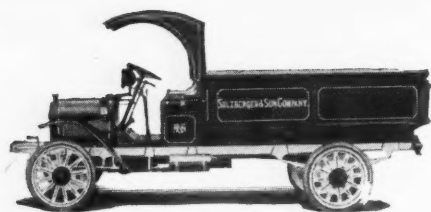
BODY DETAILS OF CARS NOT ILLUSTRATED

Paragon 1-ton Flareboard, \$890.

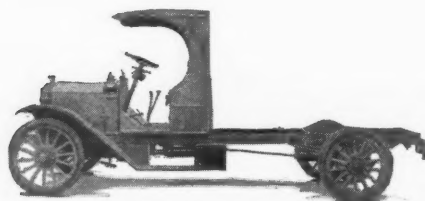
Lambert Model V 4, 1 1/2-ton Stake, \$1900.
Made by Buckeye Mfg. Co.

Continental Model W-10, 1 1/2-ton Chassis, \$1850.

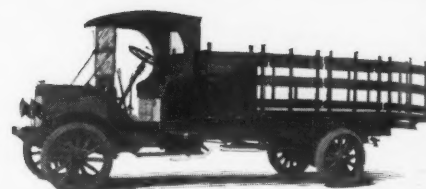
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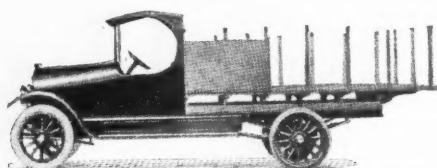
Dart 1 1/2-ton Flareboard, \$1850.



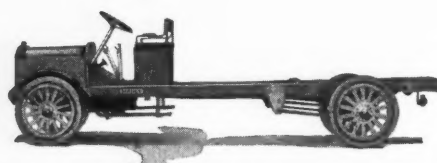
Hawkeye Model H, 1 1/2-ton Chassis, \$1300.

Menominee Model H, 1 1/2-ton Stake, \$1900.
Also Flareboard, \$1875; Panel, \$2000; Screen Side Express, \$2000; for 144 in. wheelbase, \$25 additional.

Diamond T, Model J 4, 1 1/2-ton Covered Flareboard, Chassis, \$2000.

Jeffery All-Purpose, 1 1/2-ton Stake, \$1650.
Without Cab, \$1575.
Made by Nash Motors Co.

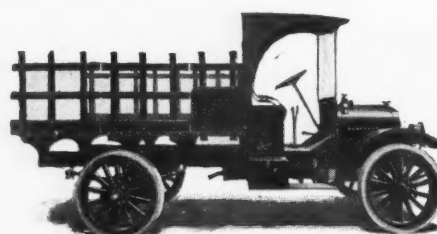
Service Model 130, 1 1/2-ton Panel, \$1950.



Manly Model 30, 1 1/2-ton Chassis, \$1800.



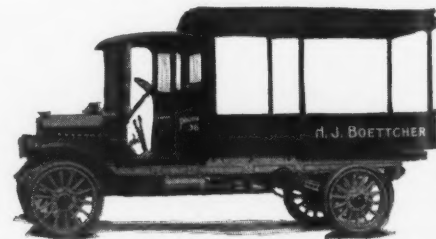
Republic Model 11, 1 1/2-ton Chassis, \$1275.



Gary Model G, 1 1/2-ton Stake.



Stegeman 1 1/2-ton Covered Flareboard, Chassis, \$1900.



Moon Model B, 1 1/2-ton Covered Flareboard, \$1950.

1 1/2 Ton Gasoline

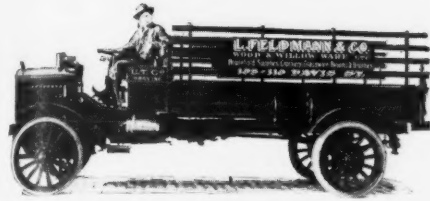
Model	Chassis Weight	Chassis Price	Engine Make	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Radiator	Carburetor	Ignition Type	Ignition Make
Gary Motor Truck Co., Gary, Ind.													
G	....	....	B	29	4	4.25	5.5	B	C	..	SB	M	E
General Motors Truck Co., Pontiac, Mich.													
31	4300	2100	C	23	4	3.75	5	B	C	T	M	M	E
31	4300	2100	C	23	4	3.75	5	B	C	T	M	M	E
Hawkeye Mfg. Co., Sioux City, Ia.													
H	3160	1300	V	23	4	3.75	5	B	G	H	MS	M	E
Klieber & Co., San Francisco, Cal.													
A	4250	2250	C	27	4	4.12	5.25	B	T	T	SL	M	B
A	4250	2250	C	27	4	4.12	5.25	B	T	T	SL	M	B
A	4250	2250	C	27	4	4.12	5.25	B	T	T	SL	M	B
Manly Motor Corp., Chicago, Ill.													
30	3450	1800	U	23	4	3.75	5.25	B	C	I	Z	M	B
30	3450	1800	U	23	4	3.75	5.25	B	C	I	Z	M	B
Menominee Motor Truck Co., Menominee, Mich.													
H	4150	1775	C	23	4	3.75	5.25	B	G	C	SB	M	B
H	4150	1775	C	23	4	3.75	5.25	B	G	C	SB	M	B
Jos. W. Moon Buggy Co., St. Louis, Mo.													
B	3400	1600	C	23	4	3.75	5.25	B	C	H	SB	M	B
B	3400	1600	C	23	4	3.75	5.25	B	C	H	SB	M	B
Moreland Motor Truck Co., San Francisco, Cal.													
.....	3550	2100	C	27	4	4.12	5.25	B	C	C	E	M	DX
Nash Motors Co., Kenosha, Wis.													
All Purpose	....	1515	O	23	4	3.75	5.25	B	C	H	SB	M	..
All Purpose	....	1515	O	23	4	3.75	5.25	B	C	H	SB	M	..
Republic Motor Truck Co., Alma, Mich.													
11	....	1275	C	23	4	3.75	5	T	T	C	SB	M	..
Sandow Motor Truck Co., Chicago, Ill.													
.....	....	2000	C	27	4	4.5	5.5	B	C	H	SB	M	B
Service Motor Truck Co., Wabash, Ind.													
130	4000	1950	B	27	4	4	5.5	B	C	V	SB	M	E
Signal Motor Truck Co., Detroit, Mich.													
4	3975	1800	C	27	4	4.12	5.25	B	C	T	SB	M	E
4	3975	1800	C	27	4	4.12	5.25	B	C	T	SB	M	E
4	3975	1800	C	27	4	4.12	5.25	B	C	T	SB	M	E
Star Carriage Co., Seattle, Wash.													
.....	4100	2150	C	27	4	4.12	5.25	B	C	T	SB	M	B
Stegeman Motor Car Co., Milwaukee, Wis.													
.....	4200	1900	C	29	6	3.5	5.25	B	C	H	R	M	..
Universal Service Co., Detroit, Mich.													
G	....	1950	B	23	4	3.75	5.5	B	C	T	Z	M	E
Viall Motor Car Co., Chicago, Ill.													
.....	....	1650	B	19	4	3.37	5.5	P	C	T	R	M	B
Wichita Falls Motor Co., Wichita Falls, Texas.													
L	3920	1800	O	20	4	3.5	5	B	T	C	SB	M	DX
H. C. Wilcox Motor Co., Minneapolis, Minn.													
R	4100	....	O	29	4	4.25	5	P	C	C	R	M	B
Zeltner & Lamson Motor Truck Co., Chicago, Ill.													
.....	3800	1950	S	26	4	4	5	B	C	C	SB	M	B

1 3/4 Ton Gasoline

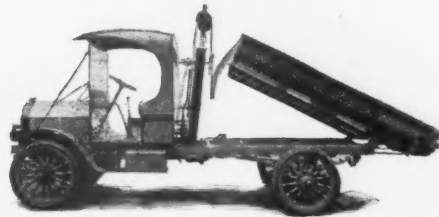
Packard Motor Car Co., Detroit, Mich.													
1 1/2 D	4400	2500	O	26	4	4	5.5	B	C	T	O	M	SD
1 1/2 D	4400	2500	O	26	4	4	5.5	B	C	T	O	M	SD

2 Ton Gasoline

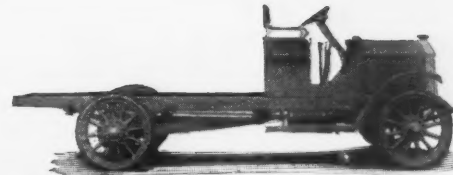
Available Truck Co., Chicago, Ill.													
2	4200	2250	C	27	4	4.12	5.25	B	G	C	SB	M	B



Wichita Model L, 1/2-ton Special Flareboard, Chassis, \$1800.
Also Stake, \$1925; Flareboard, \$1895.



Wilcox Model 4, 1/2-ton Hydraulic Hoist Dump Body.



Universal Model G, 1/2-ton Chassis, \$1950.

Commercial Cars

Spark-plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Rear Axles	Front Tires	Rear Tires	Driver's Seat	Brake and Gear Lever Location	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
..	F	D	W	Gary Motor Truck Co., Gary, Ind.	S 3	..	36x3 1/2	36x5	L	C	144	..	..
2	F	D	W	General Motors Truck Co., Pontiac, Mich.	S 4	F	36x3 1/2	36x5	L	C	130	..	70
2	F	D	W		S 4	F	36x3 1/2	36x5	L	C	144	..	70
2	F	D	I	Hawkeye Mfg. Co., Sioux City, Ia.	G 3	R	34x3 1/2	34x5	L	C	136	..	64
2	F	D	W	Klieber & Co., San Francisco, Cal.	B 3	F	36x3 1/2	36x5	R	C	130	..	80
2	F	D	W		B 3	F	36x3 1/2	36x5	R	C	140	..	90
2	F	D	W		B 3	F	36x3 1/2	36x5	R	C	150	..	90
2	S	D	W	Manly Motor Corp., Chicago, Ill.	I 3	S	36x4	36x5	L	C	156	B	..
2	S	D	W		I 3	S	36x4	36x5	L	C	168	B	..
2	F	D	W	Menominee Motor Truck Co., Menominee, Mich.	S 3	F	36x3 1/2	36x5	L	C	130	..	70
2	F	D	W		S 3	F	36x3 1/2	36x5	L	C	144	..	70
2	F	C	C	Jos. W. Moon Buggy Co., St. Louis, Mo.	U 3	N	36x3	36x4	L	C	125	..	..
2	F	C	C		U 3	N	36x3	36x4	L	C	140	..	..
2	S	D	W	Moreland Motor Truck Co., San Francisco, Cal.	B 3	T	34x3 1/2	34x5	R	C	126	..	65
2	F	D	I	Nash Motors Co., Kenosha, Wis.	S 3	Q	34x4 1/2	34x5	L	C	130	BJ	80
2	F	D	I		S 3	Q	34x4 1/2	34x5	L	C	142	BJ	80
1/2	..	D	I	Republic Motor Truck Co., Alma, Mich.	S 3	B	34x3	34x5	L	C	144	..	..
2	S	D	W	Sandow Motor Truck Co., Chicago, Ill.	S 3	T	3 1/2	5	L	C	155	..	70
2	S	D	W	Service Motor Truck Co., Wabash, Ind.	B 3	F	36x3 1/2	36x5	L	C	155	WS	66
2	S	D	W	Signal Motor Truck Co., Detroit, Mich.	B 3	T	34x3 1/2	36x5	L	C	120	..	70
2	S	D	W		B 3	T	34x3 1/2	36x5	L	C	144	..	70
2	S	D	W		B 3	T	34x3 1/2	36x5	L	C	168	..	70
2	F	C	W	Star Carriage Co., Seattle, Wash.	C 3	N	34x3 1/2	36x6	L	C	140	..	80
2	F	D	W	Stegeman Motor Car Co., Milwaukee, Wis.	S 3	F	34x3 1/2	36x5	L	L	150	WS	80
2	F	D	W	Universal Service Co., Detroit, Mich.	C 3	F	34x3 1/2	34x5	L	C	130	..	79
2	S	D	W	Viall Motor Car Co., Chicago, Ill.	S 3	T	36x3	36x4	L	C	..	..	75
2	F	C	W	Wichita Falls Motor Co., Wichita Falls, Texas.	C 3	N	36x3	36x5	R	C	118	..	..
2	S	C	W	H. C. Wilcox Motor Co., Minneapolis, Minn.	S 3	N	36x4	36x5	L	C	144	B	80
2	F	D	W	Zeitler & Lamson Motor Truck Co., Chicago, Ill.	S 3	N	36x3 1/2	36x5	L	C	150	..	85

Commercial Cars

S	F	D	W	Packard Motor Car Co., Detroit, Mich.	O 3	O	34x3 1/2	34x3 1/2 D	L	L	126	BJ	90
S	F	D	W		O 3	O	34x3 1/2	34x3 1/2 D	L	L	144	BJ	90

Commercial Cars

S	S	D	W	Available Truck Co., Chicago, Ill.	S 3	F	36x4	36x7	L	C	144
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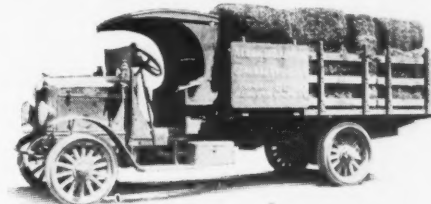
Northwestern Model W, 1/2-ton Covered Flareboard, \$2300.
Made by Star Carriage Co.



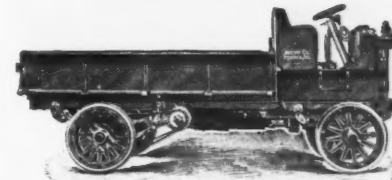
G M C Model 31, 1/2-ton Flareboard, \$2225.
Also Stake, \$2270; Panel, \$2400; Screen Side Express, \$2300; Covered Flareboard, \$2300.
Made by General Motors Co.



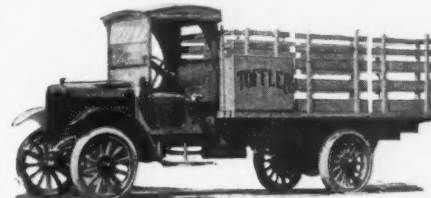
Zeitler & Lamson, 1/2-ton Panel, \$2125.
Also Stake, \$2075; Flareboard, \$2025; Screen Side Express, \$2100; Covered Flareboard, \$2100.



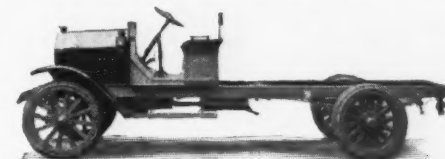
Acason 2-ton Stake.



Avery Model B, 2-ton Flareboard, Chassis, \$2500.
Also Stake, \$2075; Panel, \$3000; Flareboard, \$2600.



Acme Model A, 2-ton Stake, \$2330.
Also Flareboard, \$2335; Panel, \$2340; Screen Side Express, \$2495; Covered Flareboard, \$2495; Hydraulic Hoist, \$2675; Mechanical Hoist, \$2625; Stationary Steel, \$2425; Moving Van, \$2535.
Made by the Cadillac Auto Truck Co.

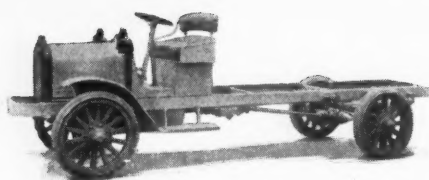


Little Giant Model 16, 2-ton Chassis, \$2500.
Made by Chicago Pneumatic Tool Co.

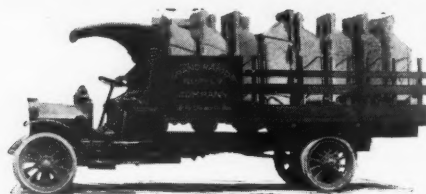


Available Model 2, 2-ton Special Body, Chassis, \$2250.

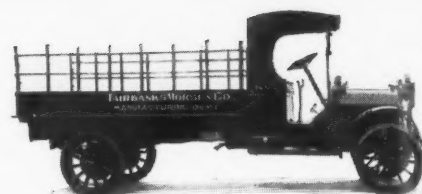
BODY DETAILS OF CARS NOT ILLUSTRATED
Lambert Model V 5, 1-ton Open Flareboard, \$2200.
Made by Buckeye Mfg. Co.



Columbia Model E, 2-ton Chassis, \$1750.
Also Flareboard, \$1875.



Federal Model P, 2-ton Stake, Chassis, \$2100.



Diamond T Model J 3, 2-ton Sided Stake, Chassis, \$2325.

2 Ton Gasoline



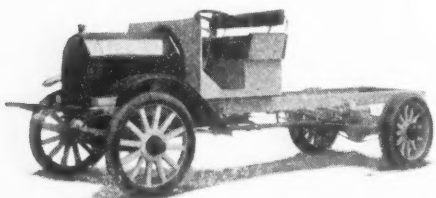
Fargo Model N, 2-ton Flareboard, \$1875.
Also Stake, \$1875; Panel, \$2100; Screen Side Express, \$1950; Covered Flareboard, \$1915.



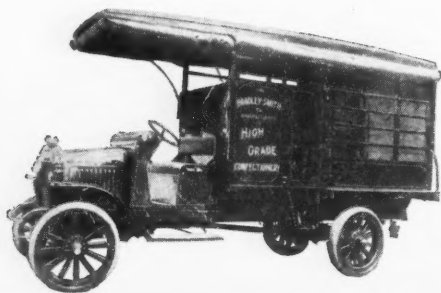
DeKalb Model E, 2-ton Stake, \$2200.
Also Flareboard, \$2200; Panel, \$2250; Screen Side Express, \$2225; Covered Flareboard, \$2225.



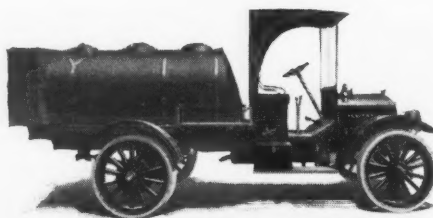
G M C Model 41, 2-ton Covered Flareboard, \$2805.
Also Stake, \$2750; Flareboard, \$2730; Panel, \$2930; Screen Side Express, \$2845.
Made by General Motors Truck Co.



Dorris Model I B W, 2-ton Chassis, \$1990.



Denby Model H, 2-ton Special Body, \$1790.

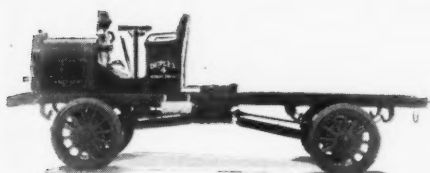


Gary Model H, 2-ton Tank Body.



Forschler Model B, 2-ton Stake, Chassis, \$2250.

Model	Chassis Weight	Chassis Price	Engine Make	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Radiator	Carburetor	Ignition Type	Ignition Make
B	5450	2500	Avery Co., Peoria, Ill.	36	4	4.75	5	S	C	V	R	M	E
.....	5000	....	Acason Motor Truck Co., Detroit, Mich.	29	4	4.25	5.75	P	C	T	SL	M	E
Lambert V-5	....	....	Buckeye Mfg. Co., Anderson, Ind.	33	4	4.5	5	S	C	V	SL	M	R
A	4112	2200	Cadillac Auto Truck Co., Cadillac, Mich.	27	4	4.12	5.25	B	C	T	R	M	E
16	4300	2500	Chicago Pneumatic Tool Co., Chicago, Ill.	27	4	4.12	5.25	B	G	C	SL	M	E
E	4000	1750	Columbia Motor Truck & Trailer Co., Pontiac, Mich.	27	4	4.12	5.5	B	C	..	SH	M	E
CC	4685	2470	Dart Motor Truck Co., Waterloo, Ia.	29	4	4.25	5.5	B	C	H	SB	M	E
C	4950	....	Duplex Power Car Co., Charlotte, Mich.	27	4	4.12	5.5	B	W	V	SL	M	E
IBW	4825	1990	Dorris Motor Car Co., St. Louis, Mo.	31	4	4.37	5	P	C	H	SB	M	B
IBW	4825	1990	O	31	4	4.37	5	P	C	H	SB	M	B
H	4100	1790	Denby Motor Truck Co., Detroit, Mich.	23	4	3.75	5	B	T	..	SB	M	E
E2	4350	2100	De Kalb Wagon Co., De Kalb, Ill.	27	4	4.12	5.25	B	C	T	MS	M	E
E2	4350	2100	C	27	4	4.12	5.25	B	C	T	MS	M	E
J3	....	2325	Diamond T Motor Car Co., Chicago, Ill.	27	4	4.12	5.25	B	C	H	R	M	B
J3	....	2325	C	27	4	4.12	5.25	B	C	H	R	M	B
N	4100	1390	Fargo Motor Car Co., Chicago, Ill.	23	4	3.75	5	B	T	T	R	M	B
NN	4100	1390	C	23	4	3.75	5	B	T	T	R	M	B
N	4100	1390	C	23	4	3.75	5	B	T	T	R	M	B
O	4300	2100	Federal Motor Truck Co., Detroit, Mich.	27	4	4.12	5.25	E	C	C	SB	M	E
P	4300	2100	C	27	4	4.12	5.25	E	C	C	SB	M	E
B	4000	2250	Forschler Motor Truck Mfg. Co., New Orleans, La.	27	4	4.12	5.25	B	C	T	Z	M	B
H	....	....	Gary Motor Truck Co., Gary, Ind.	29	4	4.25	5.5	B	C	..	SB	M	E
H	....	....	B	29	4	4.25	5.5	B	C	..	SB	M	E
41	4650	2550	General Motors Truck Co., Pontiac, Mich.	27	4	4.12	5.12	B	C	T	M	M	E
41	4650	2550	C	27	4	4.12	5.12	B	C	T	M	M	E
G	3800	1850	Independent Motors Co., Port Huron, Mich.	27	4	4.12	5.25	B	W	C	M	M	E
BB	4750	2400	Klieber & Co., San Francisco, Cal.	27	4	4.12	5.25	B	P	T	SL	M	B
BB	4750	2400	C	27	4	4.12	5.25	B	P	T	SL	M	B
BB	4750	2400	C	27	4	4.12	5.25	B	P	T	SL	M	B
.....	4300	1875	Kissel Motor Car Co., Hartford, Wis.	32	4	4.5	5.5	B	W	..	SB	M	..
LI	3800	1600	Wm. Landshaft & Sons, Chicago, Ill.	27	4	4.12	5.5	B	C	H	..	M	..
.....	4200	2000	Lewis-Hall Iron Works, Detroit, Mich.	27	4	4.12	5.25	P	C	V	Z	M	E
M	4300	1890	Master Motor Truck Co., Chicago, Ill.	29	4	4.25	5.5	B	C	H	MS	M	B
D	4525	2240	Menominee Motor Truck Co., Menominee, Mich.	27	4	4.12	5.25	B	G	C	SB	M	B
D	4525	2240	C	27	4	4.12	5.25	B	G	C	SB	M	B
Quad	....	2900	Nash Motors Co., Kenosha, Wis.	29	4	4.25	5.5	P	C	H	SB	M	..
Quad	....	2900	B	29	4	4.25	5.5	P	C	H	SB	M	..
E2	4400	2250	Nelson & Le Moon, Chicago, Ill.	27	4	4.12	5.25	B	C	T	R	M	B



Duplex Four-Wheel Drive, Model E, 2-ton Chassis.

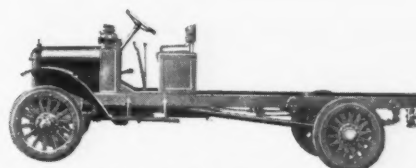


Kissel Kar 2-ton Stake, \$2025.

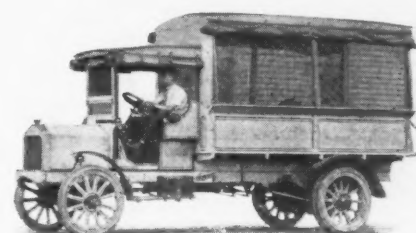
Palmer 2-ton Stake.
Made by Palmer-Meyer Motor Car Co.

Commercial Cars

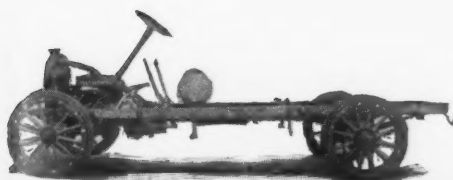
Spur-Ping Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Rear Axles	Front Tires	Rear Tires	Driver's Seat	Brake and Gear Lever Location	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
S	S	E	C	Avery Co., Peoria, Ill.	S 3 Q	36x4	36x3½D	R	C	128	..	70	
S	S	D	W	Acason Motor Truck Co., Detroit, Mich.	S 4 F	34x4	36x3½D	L	C	150	..	80	
S	S	..	C	Buckeye Mfg. Co., Anderson, Ind.	Q 1000 Q	36x4	36x5	R	R	120	..	..
S	F	D	W	Cadillac Auto Truck Co., Cadillac, Mich.	S 3 T	36x4	36x6	L	C	148	..	75	
S	F	D	W	Chicago Pneumatic Tool Co., Chicago, Ill.	B 3 T	36x4	36x6	R	C	144	..	92	
S	F	C	I	Columbia Motor Truck & Trailer Co., Pontiac, Mich.	C 3 U	36x4	36x6	L	C	144	..	..
S	F	D	W	Dart Motor Truck Co., Waterloo, Ia.	F 4 T	36x4	36x4D	L	C	150	..	75	
S	S	D	I	Duplex Power Car Co., Charlotte, Mich.	B 4 O	36x4	36x4	L	C	130	WS	57	
S	G	D	W	Dorris Motor Car Co., St. Louis, Mo.	S 3 T	36x4	36x4D	L	C	144	..	60	
S	G	D	W		S 3 T	36x4	36x4D	L	C	162	..	60	
S	F	D	I	Denby Motor Truck Co., Detroit, Mich.	D 3 U	36x3½	36x6	L	C	144	BJ	89	
M	F	C	W	De Kalb Wagon Co., De Kalb, Ill.	C 3 T	36x3½	36x5	L	C	136	..	70	
M	F	C	W		C 3 T	36x3½	36x5	L	C	146	..	70	
S	S	D	W	Diamond T Motor Car Co., Chicago, Ill.	B 3 T	36x4	36x6	R	C	154	..	..
S	S	D	W		B 3 T	36x4	36x6	R	C	160	..	..
S	S	D	I	Fargo Motor Car Co., Chicago, Ill.	F 3 U	36x4	36x6	L	C	132	..	85	
S	S	D	I		F 3 U	36x4	36x6	L	C	144	..	85	
S	S	D	I		F 3 U	36x4	36x6	L	C	156	..	85	
S	F	C	W	Federal Motor Truck Co., Detroit, Mich.	C 3 T	36x4	36x4D	L	C	144	WS	70	
S	F	C	W		C 3 T	36x4	36x4D	L	C	168	WS	70	
S	D	F	W	Forschler Motor Truck Mfg. Co., New Orleans, La.	F 3 N	34x4	34x6	L	C	144	..	69	
..	F	D	W	Gary Motor Truck Co., Gary, Ind.	S 3 ..	36x4	36x6	L	C	144	..	..
..	F	D	W		S 3 ..	36x4	36x6	L	C	156	..	..
S	F	D	W	General Motors Truck Co., Pontiac, Mich.	S 4 F	36x4	36x4D	L	C	144	..	74	
S	F	D	W		S 4 F	36x4	36x4D	L	C	158	..	74	
S	F	D	W	Independent Motors Co., Port Huron, Mich.	S 3 F	37x3½	37x5	L	C	144	..	..
S	F	D	W	Klieber & Co., San Francisco, Cal.	B 3 S	36x4	36x3½D	R	C	130	..	80	
S	F	D	W		B 3 S	36x4	36x3½D	R	C	140	..	90	
S	F	D	W		B 3 S	36x4	36x3½D	R	C	150	..	90	
..	S	C	W	Kissel Motor Car Co., Hartford, Wis.	S 3 T	34x3½	36x6	L	C	144	..	..
S	S	D	I	Wm. Landshaft & Sons, Chicago, Ill.	S 3 Q	34x4	36x6	L	C	144	..	75	
S	F	D	W	Lewis-Hall Iron Works, Detroit, Mich.	C 3 T	36x4	36x4D	L	C	132	..	78	
S	F	D	I	Master Motor Truck Co., Chicago, Ill.	F 3 B	36x4	36x6	L	C	144	..	70	
S	F	D	W	Menominee Motor Truck Co., Menominee, Mich.	S 3 F	36x4	36x6	L	C	144	..	80	
S	F	D	W		S 3 F	36x4	36x6	L	C	160	..	80	
S	F	D	I	Nash Motors Co., Kenosha, Wis.	I 4 Q	36x5	36x5	L	C	128	BJ	55	
S	F	D	I		I 4 Q	36x5	36x5	L	C	142	BJ	55	
S	F	D	W	Nelson & Le Moon, Chicago, Ill.	S 3 T	36x4	36x7	R	C	O	WS	..	

Menominee Model D, 2-ton High Stake, \$2390.
Also Flareboard, \$2390.

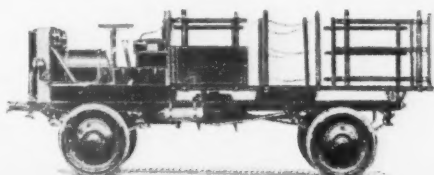
Republic Model A, 2-ton Chassis, \$1675.

Standard Model 60, 2-ton Covered Flareboard,
Chassis, \$2850.Standard Model 70, 2-ton Screen Side Express,
Chassis, \$2000.

Service Model 140, 2-ton Special Body, \$2250.



Independent Model G, 2-ton Chassis, \$1850.

Jeffery Quad, 2-ton Stake, \$3000.
Made by Nash Motors Co.

BODY DETAILS OF CARS NOT ILLUSTRATED

Dart Model C C, 2-ton Chassis, \$2470.

Also Stake, \$2600; Flareboard, \$2586.

LAST HALF OF REVIEW. FIRST HALF WAS IN THE JANUARY ISSUE



Ware 2-ton Stake.
Made by Twin City 4-Wheel Drive Co.



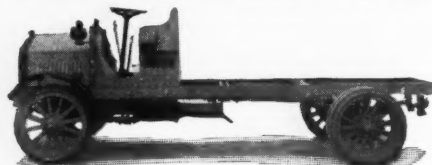
Wichita Model M, 2-ton Stake, \$2250.
Also Flareboard \$2200.



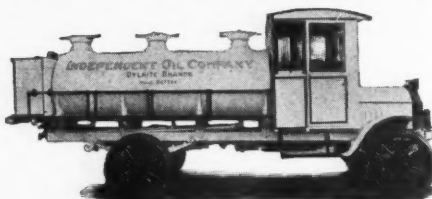
Wilson Model E, 2-ton Chassis, \$2350.



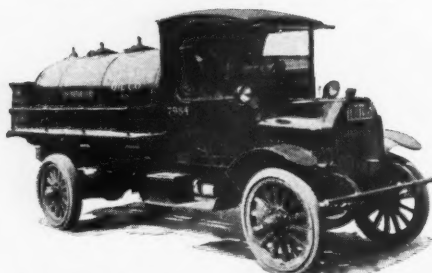
Reo Model J, 2-ton Screen Side Express, \$2035.
Also Low Stake, \$1800; High Stake, \$1825;
Flareboard, \$1810; Covered Flareboard, \$1960.



United Model B S W, 2-ton Chassis, \$2250.



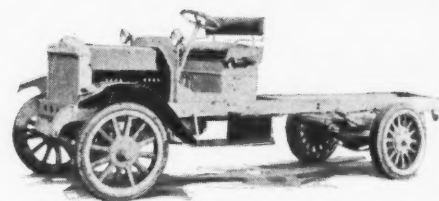
Wilcox Model Q, 2-ton Tank Body.



Harvey Model W F A, 2 1/2-ton Tank, Chassis,
\$2500.



Wichita Model R, 2 1/2-ton Bottlers' Body, Chassis, \$2350.
Also Stake, \$2555; Flareboard, \$2500.



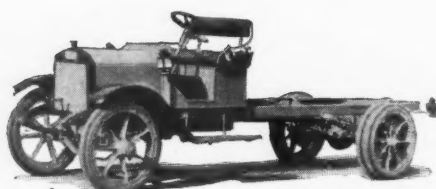
Gersix Model G, 2 1/2-ton Chassis, \$2650.
Made by Gerlinger Motor Car Co.

2 Ton Gasoline

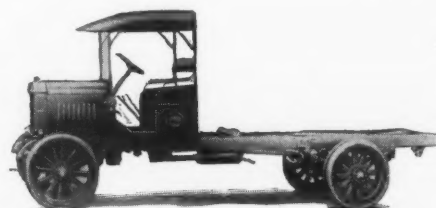
Model	Chassis Weight	Chassis Price	Engine Make	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Radiator	Carburetor	Ignition Type	Ignition Make
.....	4500	....	Palmer-Meyer Motor Car Co., St. Louis, Mo.	C 27 4	4.12 5.25	B	C	C	C	SB	M	B	
J	4450	1650	Reo Motor Car Co., Lansing, Mich.	O 27 4	4.12 5.5	B	C	T	J	M	N		
A	....	1675	Republic Motor Truck Co., Alma, Mich.	B 27 4	4.12 5.5	B	C	C	SB	M	..		
.....	....	2350	Sandow Motor Truck Co., Chicago, Ill.	C 27 4	4.12 5.25	B	C	H	SB	M	B		
140	4800	2250	Service Motor Truck Co., Wabash, Ind.	B 27 4	4.12 5.5	B	C	V	SB	M	E		
.....	5000	2100	Signal Motor Truck Co., Detroit, Mich.	C 27 4	4.12 5.25	B	C	H	SB	M	E		
.....	5000	2100	C 27 4	4.12 5.25	B	C	H	SB	M	E			
70	5100	2000	Standard Motor Truck Co., Detroit, Mich.	C 27 4	4.12 5.25	B	G	V	SL	M	E		
60	6600	2850	C 32 4	4.5 5.5	P	G	V	SB	M	E			
.....	5000	....	Twin City Four Wheel Drive Co., St. Paul, Minn.	.. 29 4	4.25 5	P	W	H	R	M	B		
.....	5000	....	.. 29 4	4.25 5	P	W	H	R	M	B			
BSW	4700	2250	United Motors Co., Grand Rapids, Mich.	C 27 4	4.12 5.25	B	C	H	MS	M	E		
BSW	4700	2250	C 27 4	4.12 5.25	B	C	H	MS	M	E			
A	....	3400	Universal Service Co., Detroit, Mich.	O 26 4	4 5.5	P	C	C	Z	M	E		
.....	4000	2250	Velle Motor Vehicle Co., Moline, Ill.	C 27 4	4.12 5.25	B	C	T	SB	M	B		
.....	4000	2250	C 27 4	4.12 5.25	B	C	T	SB	M	B			
.....	....	1800	Viall Motor Car Co., Chicago, Ill.	B 29 4	4.25 5.5	P	C	C	R	M	B		
M	4350	2100	Wichita Falls Motor Co., Wichita Falls, Texas.	O 20 4	3.5 5.5	B	T	C	SB	M	DX		
B	3800	2100	O 20 4	3.5 5.5	B	T	C	SB	M	DX			
Q	4700	....	H. E. Wilcox Motor Co., Minneapolis, Minn.	O 29 4	4.25 5	P	C	C	R	M	B		
Q	4700	....	O 29 4	4.25 5	P	C	C	R	M	B			
E	4500	2350	J. C. Wilson Co., Detroit, Mich.	.. 27 4	4.12 5.25	B	G	T	..	M	E		

2 1/2 Ton Gasoline

C	3800	1475	Beck & Son, Cedar Rapids, Ia.	C 29 4	4.25 5.5	B	T	C	SB	M	E		
W-21	3500	2000	Continental Truck Mfg. Co., Superior, Wis.	C 25 4	3.75 5	B	C	C	SB	M	E		
K	....	2090	Denby Motor Truck Co., Detroit, Mich.	C 23 4	3.75 5	B	T	..	SB	M	E		
E2 1/2	3900	2450	De Kalb Wagon Co., De Kalb, Ill.	C 27 4	4.12 5.25	B	C	T	MS	M	E		
E2 1/2	3900	2450	C 27 4	4.12 5.25	B	C	T	MS	M	E			
DW	5015	2800	De Martini Motor Truck Co., San Francisco, Cal.	B 26 4	4 5.5	B	C	T	SB	M	B		
.....	4000	2250	Forschler Motor Truck Mfg. Co., New Orleans, La.	C 27 4	4.12 5.25	B	C	T	Z	M	B		
G	5100	2650	Gerlinger Motor Car Co., Tacoma, Wash.	B 29 6	3.5 5.12	B	C	C	R	M	B		
WFA	5600	2500	Harvey Motor Truck Co., Harvey, Ill.	B 29 4	4.25 5.5	B	C	H	SB	M	E		
B	....	2750	Kleiber & Co., San Francisco, Cal.	C 27 4	4.12 5.25	B	G	T	SL	M	B		
B	....	2750	C 27 4	4.12 5.25	B	G	T	SL	M	B			
B	....	2750	C 27 4	4.12 5.25	B	G	T	SL	M	B			

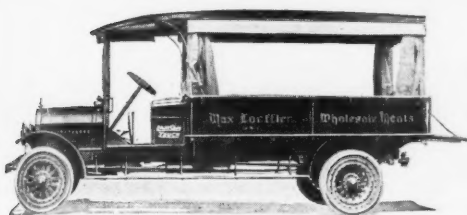


Dart Model CC, 2 1/2-ton Chassis, \$2470.
Also Stake, \$2600; Flareboard, \$2586.



Velle Biltwell Model 25, 2-ton Chassis, \$2250.
Also Stake \$2500.

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Zeittler & Lamson, 2 1/2-ton Covered Flareboard, Chassis, \$2450.



Wichita Model B, 2-ton Special Body, Chassis, \$2100.

Also Stake, \$2225; Flareboard, \$2200.



Union Model B, 2 1/2-ton Panel, Chassis, \$1875. Also Stake, \$1975; Flareboard, \$2000; Screen Side Express, \$2100; Covered Flareboard, \$2050.

Commercial Cars

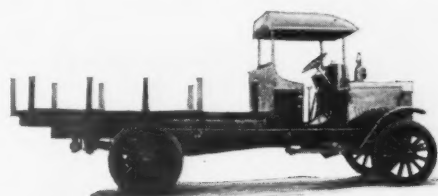
Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Rear Axles	Front Tires	Rear Tires	Driver's Seat	Brake and Gear Lever Location	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
S	D	W	S	Palmer-Meyer Motor Car Co., St. Louis, Mo.									
1/2	S	D	C	D	3	T	36x3 1/2	36x3 1/2 D	L	C	144	..	70
S	..	D	I	Reo Motor Car Co., Lansing, Mich.									
S	S	D	W	O	3	O	36x4	36x3 1/2 D	L	C	146	..	78
S	S	D	W	Republic Motor Truck Co., Alma, Mich.									
S	S	D	W	S	3	B	34x4	34x6	L	C	144	..	..
S	S	D	W	Sandow Motor Truck Co., Chicago, Ill.									
S	S	D	W	S	3	T	4	4D	L	C	165	..	70
S	S	D	W	Service Motor Truck Co., Wabash, Ind.									
S	S	D	W	B	3	F	36x4	36x7	L	C	160	WS	60
S	S	D	W	Signal Motor Truck Co., Detroit, Mich.									
S	S	D	W	B	3	T	34x4	36x4D	L	C	150	..	70
S	S	D	W	B	3	T	34x4	36x4D	L	C	180	..	70
..	F	D	W	Standard Motor Truck Co., Detroit, Mich.									
..	F	D	W	S	3	F	36x4	36x6	L	C	140	..	75
..	F	D	B	S	3	F	36x5	36x6D	L	C	144	..	75
..	F	D	B	Twin City Four Wheel Drive Co., St. Paul, Minn.									
..	F	D	B	I	3	S	36x5	36x5	L	C	120	..	..
S	F	D	W	I	3	S	36x5	36x5	L	C	140	..	..
S	F	D	W	United Motors Co., Grand Rapids, Mich.									
S	F	D	W	F	3	S	36x4	36x4D	L	C	144	..	55
S	F	D	W	F	3	S	36x4	36x4D	L	C	168	..	55
S	F	D	C	Universal Service Co., Detroit, Mich.									
S	F	D	C	O	3	Q	36x5	36x4D	R	R	132	..	70
S	F	D	W	Velle Motor Vehicle Co., Moline, Ill.									
S	F	D	W	S	4	F	36x4	36x3 1/2 D	R	R	135	..	80
S	F	D	W	S	4	F	36x4	36x3 1/2 D	R	R	150	..	80
S	S	D	W	Viall Motor Car Co., Chicago, Ill.									
S	S	D	W	S	3	T	36x4	36x6	L	C	...	..	75
S	F	C	W	Wichita Falls Motor Co., Wichita Falls, Texas.									
S	F	C	C	C	3	N	36x3 1/2	36x6	R	C	118	..	..
S	F	C	C	C	3	N	34x3 1/2	34x6	R	C	118	..	..
S	S	C	W	H. E. Wilcox Motor Co., Minneapolis, Minn.									
S	S	C	W	S	3	N	36x4	36x3 1/2	L	C	135	B	80
S	S	C	W	S	3	N	36x4	36x3 1/2	L	C	150	B	80
S	F	C	W	J. C. Wilson Co., Detroit, Mich.									
S	F	C	W	S	3	..	36x4	36x4D	L	C	144	..	..

Commercial Cars

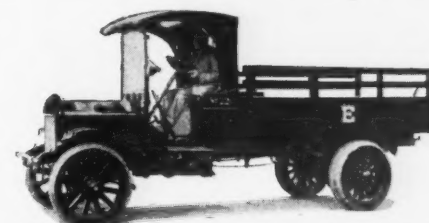
S	S	D	I	Beck & Son, Cedar Rapids, Ia.	F 3 R	3 1/2	5	L	C	144	..	60
1/2	F	..	W	Continental Truck Mfg. Co., Superior, Wis.	.. 3 ..	..	..	L	C	144	..	75
S	F	D	I	Denby Motor Truck Co., Detroit, Mich.	D 3 U	36x4	36x7	L	C	144	BJ	89 1/2
M	F	C	W	De Kalb Wagon Co., De Kalb, Ill.	C 3 T	36x4	36x6	L	C	136	..	70
M	F	C	W		C 3 T	36x4	36x6	L	C	146	..	70
S	S	D	W	De Martini Motor Truck Co., San Francisco, Cal.	B 3 N	36x4	36x7	L	C	157	..	90
S	D	F	W	Forschler Motor Truck Mfg. Co., New Orleans, La.	F 3 N	34x4	34x4D	L	C	144	..	60
S	F	D	W	Gerlinger Motor Car Co., Tacoma, Wash.	S 3 I	37x4	37x7	L	C	150	WS	80
S	F	D	W	Harvey Motor Truck Co., Harvey, Ill.	F 4 N	36x4	36x7	L	C	150	WS	80
S	F	D	W	Kleiber & Co., San Francisco, Cal.	B 3 S	36x4	36x4D	R	C	140	..	80
S	F	D	W		B 3 S	36x4	36x4D	R	C	150	..	90
S	F	D	W		B 3 S	36x4	36x4D	R	C	160	..	90



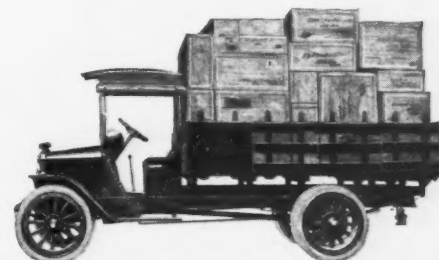
Moreland 2 1/2-ton Covered Flareboard, Chassis, \$2750.



Union Model B, 2 1/2-ton Stake, \$1975. Also Flareboard, \$2000; Screen Side Express, \$2100; Covered Flareboard, \$2050.



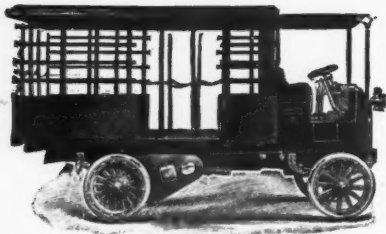
Stegeman 2 1/2-ton Flareboard, Chassis, \$2500.



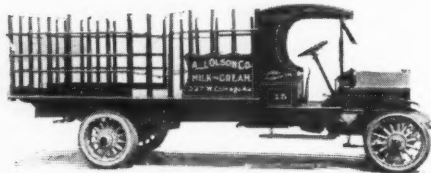
Denby Model K, 2 1/2-ton Sided Stake, \$2090.

BODY DETAILS OF CARS NOT ILLUSTRATED
Di Martini Model D W, 2 1/2-ton Chassis, \$2800.
Packard Model D D, 2 1/2-ton Stake, \$2940.
Beck Model C, 2 1/2-ton Stake, \$1575.

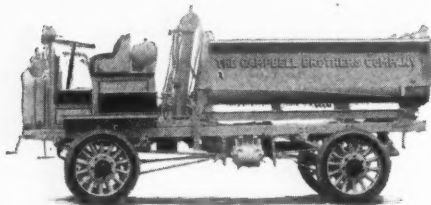
LAST HALF OF REVIEW. FIRST HALF WAS IN THE JANUARY ISSUE



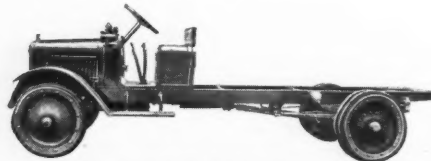
Avery Model B, 3-ton Covered Stake, \$3200.
Also Open Flareboard, \$3300; Panel, \$3475.



Nelson & Le Moon Model E, 3-ton Stake, Chassis, \$2950.



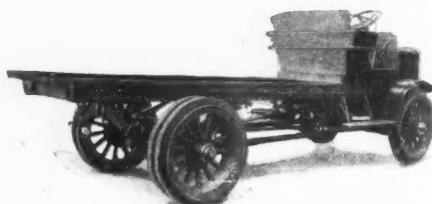
F. W. D. Model B, 3-ton Power Dump, Chassis, \$4000.
Also Stake, \$4150; Flareboard, \$4200; Panel, \$4250; Screen Side Express, \$4275; Covered Flareboard, \$4250.
Made by Four-Wheel Drive Auto Co.



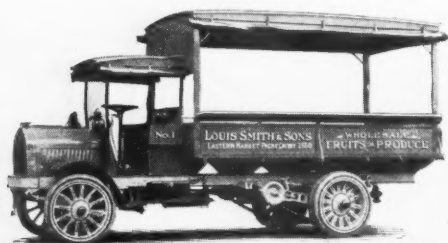
Republic Model T, 3-ton Chassis, \$2550.



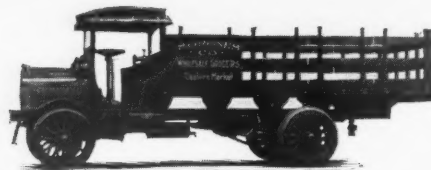
Acason, 3 1/2-ton Slat Side Stake.



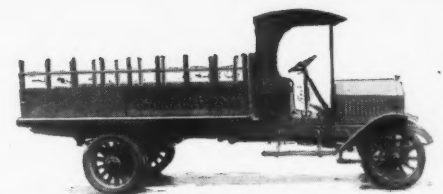
Ware 3-ton Chassis.
Made by Twin City 4-Wheel Drive Co.



Standard Model 30, 3-ton Covered Flareboard, Chassis, \$2750.



Standard Model 35, 3 1/2-ton Slat Side Stake, Chassis, \$2800.



Diamond T Model L, 3 1/2-ton Sided Stake, Chassis, \$3475.

2 1/2 Ton Gasoline

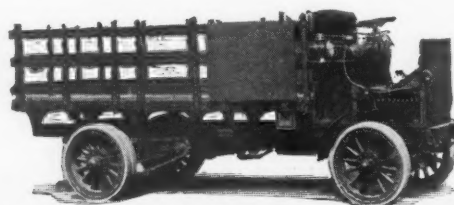
Model	Chassis Weight	Chassis Price	Engine Make	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Radiator	Carburetor	Ignition Type	Ignition Make
Manly Motor Corp., Chicago, Ill.													
50	4950	2250	U	26	4	4	5.75	P	C	T	Z	M	B
50	4950	2250	U	26	4	4	5.75	P	C	T	Z	M	B
.....	4600	2750	C	32	4	4.5	5.5	P	C	C	E	M	DX
Moreland Motor Truck Co., San Francisco, Cal.													
2D	5131	2800	O	26	4	4	5.5	B	C	T	O	M	SD
2D	5131	2800	O	26	4	4	5.5	B	C	T	O	M	SD
Stegeman Motor Car Co., Milwaukee, Wis.													
.....	5000	2500	C	29	6	3.5	5.25	..	C	H	R	M	..
.....	5000	2500	C	29	6	3.5	5.25	..	C	H	R	M	..
Union Motor Truck Co., Bay City, Mich.													
B	5500	1875	S	26	4	4	6	B	C	T	SL	M	E
Wichita Falls Motor Co., Wichita Falls, Texas.													
R	....	2350	O	23	4	3.75	5.5	B	C	C	SB	M	DX
Zeitler & Lamson Motor Truck Co., Chicago, Ill.													
.....	4300	2450	S	26	4	4	6	B	C	C	SB	M	B

3 Ton Gasoline

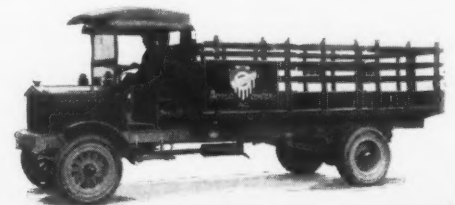
Avery Co., Peoria, Ill.													
B	6250	3200	..	36	4	4.75	5	S	C	V	R	M	E
A	....	2500	..	36	4	4.75	5	S	C	V	R	M	E
Duplex Power Car Co., Charlotte, Mich.													
D	5350	....	B	29	4	4.25	5.5	B	W	V	SL	M	E
Four Wheel Drive Auto Co., Clintonville, Wis.													
B	6400	4000	S	36	4	4.75	5.5	P	C	C	SB	M	E
Nelson & Le Moon, Chicago, Ill.													
E3	6200	2950	C	32	4	4.5	5.5	P	C	T	R	M	B
Republic Motor Truck Co., Alma, Mich.													
2	....	2550	B	27	4	4.12	5.5	B	C	C	SB	M	..
Standard Motor Truck Co., Detroit, Mich.													
30	....	2750	C	32	4	4.5	5.5	..	..	..	..	M	E
Twin City Four Wheel Drive Co., St. Paul, Minn.													
.....	6000	....	..	41	4	5.1	5.5	P	W	H	R	M	B
.....	6000	....	..	41	4	5.1	5.5	P	W	H	R	M	B
Universal Service Co., Detroit, Mich.													
B	....	2800	O	26	4	4	5.5	P	C	C	Z	M	E

3 1/2 Ton Gasoline

Available Truck Co., Chicago, Ill.													
3	6500	4300	C	32	4	4.5	5.5	P	G	C	SB	M	B
.....	7000	....	U	39	4	4.25	5.75	P	C	T	SL	M	E
Acason Motor Truck Co., Detroit, Mich.													
C	....	2800	C	32	4	4.5	5.5	B	C	T	R	M	E
Cadillac Auto Truck Co., Cadillac, Mich.													
W-31	4000	2500	C	35	4	4.5	5.5	P	C	C	SB	M	E
Continental Truck Mfg. Co., Superior, Wis.													
EW	6450	3600	B	29	4	4.25	5.5	B	C	T	SB	M	B
De Martini Motor Truck Co., San Francisco, Cal.													
L	....	3475	C	32	4	4.5	5.5	P	C	H	R	M	B
Diamond T Motor Car Co., Chicago, Ill.													
L	6300	2800	C	32	4	4.5	5.5	P	C	C	SB	M	B
L	6300	2800	C	32	4	4.5	5.5	P	C	C	SB	M	B
Federal Motor Truck Co., Detroit, Mich.													
71	6800	3500	C	32	4	4.5	5.5	P	C	T	M	M	E
71	6800	3500	C	32	4	4.5	5.5	P	C	T	M	M	E
General Motors Truck Co., Pontiac, Mich.													
WHA	7500	3250	B	29	4	4.25	6	B	C	H	SB	M	E
Harvey Motor Truck Co., Harvey, Ill.													

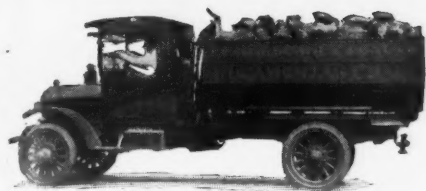


Universal Model A, 3-ton Stake, Chassis, \$3400.

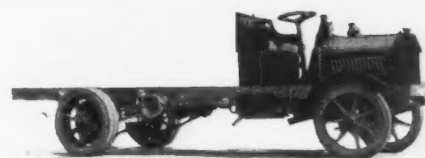


Federal Model L, 3 1/2-ton Stake, Chassis, \$2100.

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Harvey Model W H A 3 1/2-ton Dump Body, \$3250.

Hall 3 1/2-ton Worm Drive Stake, Chassis, \$2800.
Made by Lewis-Hall Iron Works.Hall 3 1/2-ton Chain Drive, Chassis, \$2800.
Made by Lewis-Hall Iron Works.

Commercial Cars

Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Rear Axles	Front Tires	Rear Tires	Driver's Seat	Brake and Gear Lever Location	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
2 1/2	2 1/2	D	W	I	3	S	36x4	40x7	L	C	168	B	..
2 1/2	2 1/2	D	W	I	3	S	36x4	40x7	L	C	180	B	..
S	S	D	W	B	4	T	34x4	34x4D	R	C	144	..	65
S	F	D	W	O	3	O	34x4	34x4D	L	L	144	BJ	90
S	F	D	W	O	3	O	34x4	34x4D	L	L	168	BJ	90
..	F	D	W	S	3	F	36x4	36x4D	L	C	144	WS	80
..	F	D	W	S	3	F	36x4	36x4D	L	C	162	WS	80
M	F	D	I	S	3	U	39x4	39x6	R	C	160	..	..
S	F	C	W	C	3	N	36x4	36x7	R	C	144	..	..
S	F	D	W	S	3	N	36x4	36x7	L	C	160	..	85

G M C Model 71, 3 1/2-ton Flareboard, \$3720.
Also Stake, \$3725.
Made by General Motors Truck Co.

Menominee Model G, 3 1/2-ton High Stake, Chassis, \$2775.



Available Model 3, 3 1/2-ton Panel, Chassis, \$3300.



Service Model 170, 3 1/2-ton Stake, Chassis, \$3000.



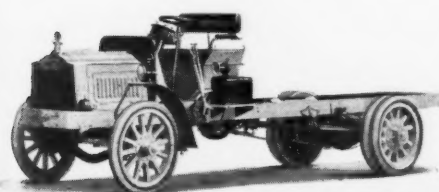
Service Model 175 Special, 3 1/2-ton Stake, \$3250.

Commercial Cars

S	S	D	C	S	3	Q	38x5	38x4D	R	C	128	..	70
S	S	D	C	S	3	Q	38x5	38x4D	R	C	140	..	..
S	S	D	I	B	4	O	36x6	36x6	L	C	130	WS	57
M	F	D	B	S	3	O	6	6	R	R	124	NE	55
S	F	D	W	S	3	T	36x5	38x5D	R	C	O	WS	..
S	..	D	I	S	4	R	36x5	36x5D	L	C	165	..	..
..	..	D	C	S	3	T	36x5	36x5D	..	..	144	..	..
..	F	D	B	I	3	S	36x6	36x6	L	C	120	..	..
..	F	D	B	I	3	S	36x6	36x6	L	C	140	..	..
S	F	D	C	O	3	Q	36x4	36x4D	R	R	132	..	70

Commercial Cars

S	S	D	W	S	3	F	36x5	40x5D	L	C	156	..	..
S	S	D	W	S	3	F	36x5	38x5D	R	C	168	..	80
S	F	D	W	A	4	T	36x5	40x5	L	C	172	..	75
1/2	F	..	W	3	..	..	..	..	L	C	..	..	75
S	F	D	W	B	3	N	36x5	36x6D	L	C	165	..	90
S	S	D	W	B	4	T	36x5	36x5D	R	C	170	..	..
S	F	D	W	B	3	T	36x5	36x5D	R	C	146	..	70
S	F	D	W	B	3	T	36x5	36x5D	R	C	170	..	70
S	F	D	W	S	4	F	36x5	40x5D	L	C	163	..	75
S	F	D	W	S	4	F	36x5	40x5D	L	C	187	..	75
S	F	D	W	B	4	N	36x5	36x5D	L	C	160	WS	80

Packard Model 3-D, 3 1/2-ton Chassis, \$3400.
With Stake Body, \$3550.

Stegeman 3 1/2-ton Stake, Chassis, \$3000.

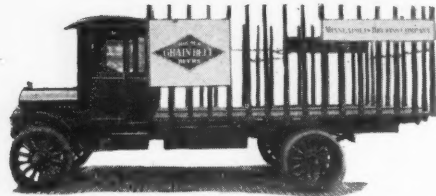
BODY DETAILS OF CARS NOT ILLUSTRATED
Di Martini Model E W, 3 1/2-ton Chassis, \$3600.Acme Model C, 3 1/2-ton Stake, \$3040.
Also Flareboard, \$3050; Panel, \$3055; Screen Side Express, \$3185; Covered Flareboard, \$3185.
Made by Cadillac Auto Truck Co.Continental Model W-31, 3 1/2-ton Chassis, \$2500.
Avery Model A, 3-ton Open Flareboard, Chassis, \$2500.

Duplex Four-Wheel Drive, Model D, 3-ton Chassis.

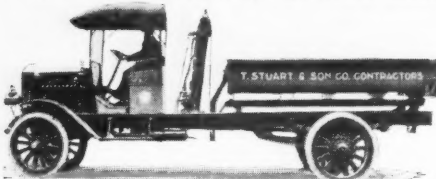
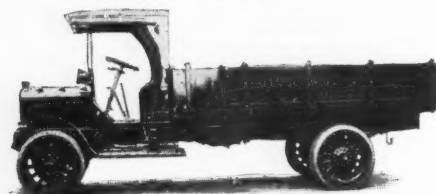
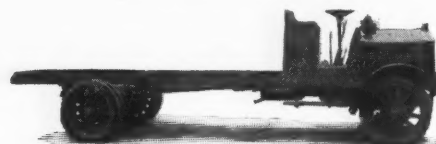
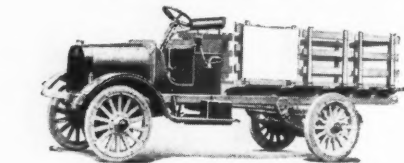
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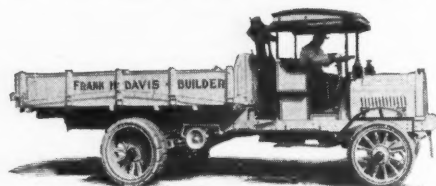
Sterling, 3 1/2-ton Stake, \$3560.



Wilcox Model P, 3 1/2-ton, High Stake Body.

Velie Biltwell Model 26, 3 1/2-ton Hydraulic Hoist Dump, Chassis, \$3350.
Also Stake, \$3500.Wichita Model O, 3 1/2-ton Stake, \$3450.
Also Flareboard, \$3450.United 3 1/2-ton, Chassis, \$2900.
Also Flareboard, \$3560.

Acme-Detroit 4-ton Stake, Chassis, \$2800.



Standard Model 40, 4-ton Sided Stake, Chassis, \$3025.



Standard Model 50, 5-ton Stake Platform, Chassis, \$3400.

3 1/2 Ton Gasoline

Model	Chassis Weight	Chassis Price	Engine Make	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Radiator	Carburetor	Ignition Type	Ignition Make
C	....	3500	C	32	4	4.5	5.5	P	G	T	SL	M	B
C	....	3500	C	32	4	4.5	5.5	P	G	T	SL	M	B
C	....	3500	C	32	4	4.5	5.5	P	G	T	SL	M	B
.....	6100	2800	C	32	4	4.5	5.5	P	C	V	Z	M	E
.....	6100	2800	C	32	4	4.5	5.5	P	C	V	Z	M	E
G	6300	2775	C	32	4	4.5	5.5	P	G	T	SB	M	B
G	6300	2775	C	32	4	4.5	5.5	P	G	T	SB	M	B
3D	6900	3400	O	32	4	4.5	5	B	C	T	O	M	SD
.....	....	3250	C	32	4	4.5	5.5	P	C	H	SB	M	B
170	6000	3000	B	29	4	4.25	5.5	B	C	T	SB	M	E
175 Special	6500	3250	B	32	4	4.5	6	B	C	T	SB	M	E
M	6700	3000	C	32	4	4.5	5.5	P	C	H	SB	M	E
M	6700	3000	C	32	4	4.5	5.5	P	C	H	SB	M	E
35	....	2800	C	32	4	4.5	5.5	..	..	..	..	M	E
.....	6000	3000	C	34	6	3.75	5.25	..	C	H	R	M	..
.....	5600	2800	U	29	4	4.25	5.75	P	..	T	H	M	E
.....	5600	2800	U	29	4	4.25	5.75	P	..	T	H	M	E
.....	6700	2900	C	32	4	4.5	5.5	P	C	H	SB	M	E
.....	6700	2900	C	32	4	4.5	5.5	P	C	H	SB	M	E
26	6400	3350	C	32	4	4.5	5.5	P	C	T	SB	M	B
26	6400	3350	C	32	4	4.5	5.5	P	C	T	SB	M	B
O	6470	3250	U	32	4	4.5	5.75	P	C	C	SB	M	DX
P	6300	....	O	29	4	4.25	5.5	P	C	C	R	M	B
P	6300	....	O	29	4	4.25	5.5	P	C	C	R	M	B
.....	6100	3250	S	36	4	4.75	5.5	P	C	C	SB	M	B

4 Ton Gasoline

.....	5600	2800	Z	36	4	4.75	6	P	C	C	Z	M	E
.....	5600	2800	Z	36	4	4.75	6	P	C	C	Z	M	E
.....	6650	3600	O	36	4	4.75	6.75	P	C	C	E	M	DX
40	3025	C	32	4	4.5	5.5	M	E

4 1/2 Ton Gasoline

4D	7308	3800	O	32	4	4.5	5	B	C	T	O	M	SD
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5 Ton Gasoline

5	8500	4400	C	32	4	4.5	5.5	P	G	C	SB	M	B
B	7750	4500	..	44	4	5.25	5.75	..	C	H	SL	M	E
R	4300	C	32	4	4.5	5.5	P	C	H	R	M	B
X	8500	....	O	29	4	4.25	5.5	B	C	T	Z	M	E
X	8500	....	O	29	4	4.25	5.5	B	C	T	Z	M	E
X	8500	....	O	29	4	4.25	5.5	B	C	T	Z	M	E
101	7800	4100	C	32	4	4.5	5.5	B	C	T	M	M	E
101	7800	4100	C	32	4	4.5	5.5	B	C	T	M	M	E
WKA	8400	4000	B	32	4	4.5	6	B	C	H	SB	M	E
D	....	4500	C	44	4	5.25	5.75	P	G	T	SL	M	B
D	....	4500	C	44	4	5.25	5.75	P	G	T	SL	M	B
D	....	4500	C	44	4	5.25	5.75	P	G	T	SL	M	B
.....	7400	3600	C	32	4	4.5	5.5	P	C	V	Z	M	E
.....	8000	4250	O	36	4	4.75	6.75	P	C	C	E	M	DX
E5	8000	4200	B	32	4	4.5	6	P	C	T	R	M	B
200	8000	4000	B	32	4	4.5	6	B	C	T	SB	M	E
R	7800	4000	C	32	4	4.5	5.5	P	C	H	SB	M	E
R	7800	4000	C	32	4	4.5	5.5	P	C	H	SB	M	E
50	3500	C	32	4	4.5	5.5	M	E
80	7400	3400	C	32	4	4.5	5.5	P	G	D	SB	M	E
.....	7000	4000	C	34	6	3.75	5.25	..	C	H	R	M	..

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Commercial Cars

Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Rear Axles	Front Tires	Rear Tires	Driver's Seat	Brake and Gear Lever Location	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
				Kleiber & Co., San Francisco, Cal.									
2 2	F	D	W	B	3	F	36x5	36x5D	R	C	150	..	80
2 2	F	D	W	B	3	F	36x5	36x5D	R	C	160	..	90
				B	3	F	36x5	36x5D	R	C	170	..	90
				Lewis-Hall Iron Works, Detroit, Mich.									
2	F	D	W	B	3	T	36x5	36x5D	L	C	144	..	78
2	F	D	C	B	3	Q	36x5	36x5D	L	C	144	..	78
				Menominee Motor Truck Co., Menominee, Mich.									
2	F	D	W	S	3	F	36x5	36x5D	L	C	160	..	80
2	F	D	W	S	3	F	36x5	36x5D	L	C	170	..	80
				Packard Motor Car Co., Detroit, Mich.									
2	F	D	W	O	3	O	36x5	36x5D	L	L	156	BJ	90
				Sandow Motor Truck Co., Chicago, Ill.									
2	S	D	W	S	3	T	5	5D	L	C	175	..	70
				Service Motor Truck Co., Wabash, Ind.									
2	F	D	W	B	4	F	36x5	36x5D	L	C	170	WS	66
2	F	D	W	B	4	F	36x5	36x5D	L	C	170	WS	70
				Signal Motor Truck Co., Detroit, Mich.									
2	S	D	W	B	3	T	36x5	40x5D	L	C	...	..	70
2	S	D	W	B	3	T	36x5	40x5D	L	C	180	..	70
				Standard Motor Truck Co., Detroit, Mich.									
..	..	D	C	S	3	T	36x5	36x5D	..	..	144	..	..
				Stegeman Motor Car Co., Milwaukee, Wis.									
..	F	D	W	S	3	F	36x4	40x5D	L	C	156	WS	80
				Sterling Motor Truck Co., Milwaukee, Wis.									
2	S	D	W	S	3	S	....	....	L	C	158	..	85
2	S	D	W	S	3	S	....	....	L	C	194	..	85
				United Motors Co., Grand Rapids, Mich.									
2	F	D	W	B	3	S	36x5	36x5D	L	C	144	..	55
2	F	D	W	B	3	S	36x5	36x5D	L	C	168	..	55
				Vellie Motor Vehicle Co., Moline, Ill.									
2	F	D	W	S	4	F	36x5	40x5D	R	R	148	..	80
2	F	D	W	S	4	F	36x5	40x5D	R	R	172	..	80
				Wichita Falls Motor Co., Wichita Falls, Texas.									
2	S	C	W	C	3	N	36x5	36x5D	L	C	165	..	..
				H. E. Wilcox Motor Co., Minneapolis, Minn.									
2	S	C	W	S	3	N	36x5	36x5D	L	C	139	B	80
2	S	C	W	S	3	N	36x5	36x5D	L	C	154	B	80
				Zeitler & Lamson Motor Truck Co., Chicago, Ill.									
2	F	D	W	S	3	N	36x5	40x5D	L	C	170	..	85

Commercial Cars

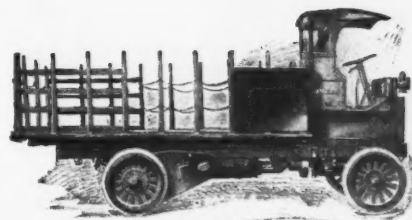
Acme Motor Truck Co., Detroit, Mich.									
S	4	O	36x4	36x4D	L	C	144	..	75
S	4	O	36x4	36x4D	L	C	156	..	75
Moreland Motor Truck Co., San Francisco, Cal.									
B	4	T	36x5	36x5D	R	C	168	..	65
Standard Motor Truck Co., Detroit, Mich.									
S	3	T	36x5	40x6D	..	..	144	..	..

Commercial Car

Packard Motor Car Co., Detroit, Mich.									
O	3	O	36x5	40x5D	L	L	156	BJ	90

Commercial Cars

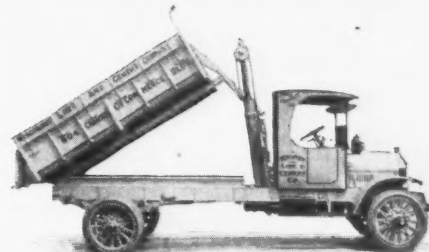
Available Truck Co., Chicago, Ill.									
S	3	F	36x6	40x6D	L	C	168	..	..
Avery Co., Peoria, Ill.									
S	3	Q	38x6	38x5D	R	C	128	..	70
Diamond T Motor Car Co., Chicago, Ill.									
B	3	T	36x6	36x6D	R	C	170	..	..
Federal Motor Truck Co., Detroit, Mich.									
O	4	T	36x6	40x6D	L	C	144	..	70
O	4	T	36x6	40x6D	L	C	136	..	70
O	4	T	36x6	40x6D	L	C	180	..	70
General Motors Truck Co., Pontiac, Mich.									
S	4	F	36x4	36x6	L	C	166	..	75
S	4	F	36x4	36x6	L	C	187	..	75
Harvey Motor Truck Co., Harvey, Ill.									
B	4	N	36x6	40x6D	L	C	160	WS	80
Kleiber & Co., San Francisco, Cal.									
B	3	S	36x6	40x6D	R	C	160	..	80
B	3	S	36x6	40x6D	R	C	170	..	90
B	3	S	36x6	40x6D	R	C	180	..	90
Lewis-Hall Iron Works, Detroit, Mich.									
B	4	Q	36x5	40x6D	L	C	144	..	90
Moreland Motor Truck Co., San Francisco, Cal.									
B	4	T	36x5	40x6D	R	C	163	..	60
Nelson & Le Moon, Chicago, Ill.									
S	3	T	36x6	40x6D	R	C	O	WS	..
Service Motor Truck Co., Wabash, Ind.									
B	4	F	36x6	40x6D	L	C	170	WS	60
Signal Motor Truck Co., Detroit, Mich.									
B	4	T	36x6	40x6D	L	C	168	..	70
B	4	T	36x6	40x6D	L	C	192	..	70
Standard Motor Truck Co., Detroit, Mich.									
B	3	T	36x5	40x6D	..	..	144	..	..
S	4	F	36x6	40x6D	L	C	152	..	70
Stegeman Motor Car Co., Milwaukee, Wis.									
S	3	F	36x5	40x6D	L	C	170	WS	80



Avery Model B, 5-ton Stake, Chassis, \$4500.
Also Open Flareboard, \$4600; Panel, \$5090.



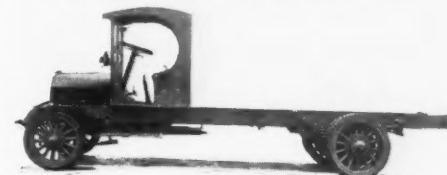
Federal Model X, 5-ton Power Dump.



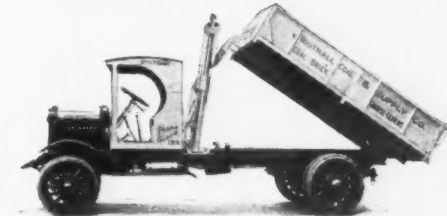
Harvey Model W K A, 5-ton Hydraulic Dump, Chassis, \$4000.



**Hall 5-ton Chain Drive Power Dump, Chassis,
\$3600.
Made by Lewis-Hall Iron Works.**



Available Model 5, 5-ton Chassis, \$4400.



Service Model 200, Hydraulic Dump Body, \$4000.



Standard Model 80, 5-ton Hydraulic Hoist Dump, Chassis, \$3400.

BODY DETAILS OF CARS NOT ILLUSTRATED

Diamond T, Model R, 5-ton Chassis, \$4300.

Packard Model 4-D, 4½-ton Stake, \$3950.

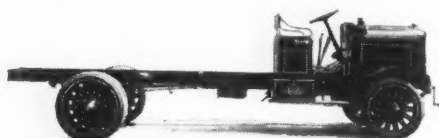
Zeitler & Lamson, 3½-ton Stake, \$3425.

Also Flareboard, \$3375; Panel, \$3475; Screen Side Express, \$3450; Covered Flareboard, \$3450.



G M C Model 101, 5-ton Power Dump, Chassis, \$4100.

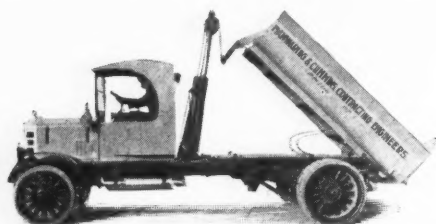
Also Stake, \$4360; Flareboard, \$4350.
Made by General Motors Truck Co.



Kleiber Model D, 5-ton Chassis, \$4500.

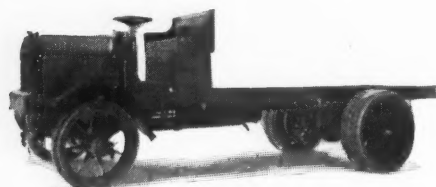


Stegeman 5-ton Flareboard, Chassis, \$5000.

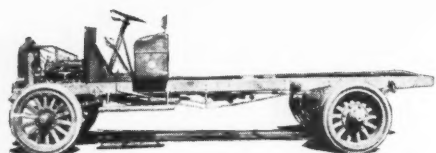


Sterling 5-ton Hydraulic Hoist Dump Body, Chassis, \$4500.

Also Stake, \$4700; Flareboard, \$4700.

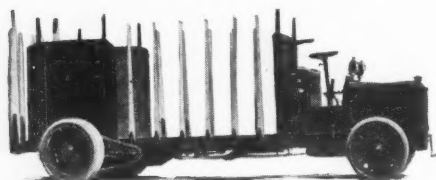


United 5-ton Chassis, \$3900.



Wichita Model Q, 5-ton Chassis, \$3850.

Also Stake, \$4100; Flareboard, \$4100.



Doane 6-ton Stake, \$4750.

BODY DETAILS OF CARS NOT ILLUSTRATED

Zeitler & Lamson, 5-ton Stake, \$4425.

Also Flareboard, \$4375; Panel, \$4475; Screen Side Express, \$4450; Covered Flareboard, \$4450.

Walker Model E, 4-ton Special Body.

Walker Model N, 5-ton Special Body.

5 Ton Gasoline

Model	Chassis Weight	Chassis Price	Engine Make	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Radiator	Carburetor	Ignition Type	Ignition Make
.....	8750	4500	Sterling Motor Truck Co., Milwaukee, Wis.										
.....	.....	.....	U	36	4	4.75	6.75	P	..	T	H	M	E
.....	.....	.....	Twin City Four Wheel Drive Co., St. Paul, Minn.										
.....	.....	.....	..	42	4	5.12	6	P	W	H	R	M	B
.....	.....	.....	..	42	4	5.12	6	P	W	H	R	M	B
.....	8700	3900	United Motors Co., Grand Rapids, Mich.										
.....	8700	3900	S	36	4	4.75	5.5	P	C	T	SB	M	E
.....	.....	.....	S	36	4	4.75	5.5	P	C	T	SB	M	E
.....	.....	3200	Viall Motor Car Co., Chicago, Ill.										
.....	.....	.....	C	40	4	5	5.5	P	C	C	R	M	B
Q	7360	3850	Wichita Falls Motor Co., Wichita Falls, Texas.										
.....	.....	.....	Q	32	4	4.5	5.75	P	C	C	SB	M	DX
.....	7100	4150	Zeitler & Lamson Motor Truck Co., Chicago, Ill.										
.....	.....	.....	S	41	4	5.1	5.5	P	C	C	SB	M	B

6 Ton Gasoline

Doane Motor Truck Co., San Francisco, Cal.

.....	10000	U	36	4	4.75	6.75	P	C	T	H	M	B
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7 Ton Gasoline

Lewis-Hall Iron Works, Detroit, Mich.

.....	7460	3600	C	32	4	4.5	5.5	P	C	V	Z	M	E
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Sterling Motor Truck Co., Milwaukee, Wis.

.....	9750	4750	U	36	4	4.75	6.75	P	..	T	H	M	E
-------	------	------	---	----	---	------	------	---	----	---	---	---	---

Gasoline Tractor

Mercury Mfg. Co., Chicago, Ill.

Bully	5200	29	4	4.25	5	..	W	M	R
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1000 Pound Electric

E. C.	Model	Weight	Chassis Price	Maximum Speed	Battery	Mileage per Charge	Motor	Controller	Speeds Forward
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Walker Vehicle Co., Chicago, Ill.

M	2300	15	ED	75	WS	WS	5
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1 Ton Electric

Walker Vehicle Co., Chicago, Ill.

K	2500	14	ED	70	WS	WS	5
---	------	------	----	----	----	----	----	---

2 Ton Electric

Walker Vehicle Co., Chicago, Ill.

L	3700	13	ED	60	WS	WS	5
---	------	------	----	----	----	----	----	---

3 Ton Electric

Walker Vehicle Co., Chicago, Ill.

D	4700	12	ED	50	WS	WS	5
---	------	------	----	----	----	----	----	---

4 Ton Electric

Walker Vehicle Co., Chicago, Ill.

E	5700	11	ED	50	WS	WS	5
---	------	------	----	----	----	----	----	---

5 Ton Electric

Walker Vehicle Co., Chicago, Ill.

N	6300	10	ED	50	WS	WS	5
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Commercial Cars

Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Rear Axles	Front Tires	Rear Tires	Driver's Seat	Brake and Gear Lever Location	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
S	S	D	W	S	4	S	....	....	L	C	168	..	85
Sterling Motor Truck Co., Milwaukee, Wis.													
..	F	D	B	I	3	S	36x5	36x6D	L	C	120	..	..
..	F	D	B	I	3	S	36x5	36x6D	L	C	140	..	..
Twin City Four Wheel Drive Co., St. Paul, Minn.													
S	F	D	W	B	4	S	36x6	40x6D	R	R	144	..	..
S	F	D	W	B	4	S	36x6	40x6D	R	R	168	..	..
United Motors Co., Grand Rapids, Mich.													
S	S	D	C	B	3	T	36x5	36x6D	R	R	...	..	75
Viall Motor Car Co., Chicago, Ill.													
S	F	C	W	C	3	N	36x6	36x6D	R	C	165	..	..
Wichita Falls Motor Co., Wichita Falls, Texas.													
S	F	D	W	S	3	N	36x6	40x6D	L	C	180	..	85
Zeitler & Lamson Motor Truck Co., Chicago, Ill.													

Commercial Car

S	S	D	C	S	3	O	36x6	40x6D	R	C	178	..	21
Doane Motor Truck Co., San Francisco, Cal.													

Commercial Cars

S	F	D	W	B	4	T	36x5	40x6D	L	C	144	..	78
Lewis-Hall Iron Works, Detroit, Mich.													
S	S	D	W	S	4	Q	....	....	L	C	168	..	90
Sterling Motor Truck Co., Milwaukee, Wis.													

Gasoline Tractor

..	..	D	C	S	3	Q	34x4	38x4	..	..	70	..	..
Mercury Mfg. Co., Chicago, Ill.													

Commercial Car

Final Drive	Rear Axle	Front Tires	Rear Tires	Rims	Steering Gear	Driver's Seat	Wheelbase	% Total Weight on Rear Wheels
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I	F	36x3	36x3½	E	W	O	90	65
Walker Vehicle Co., Chicago, Ill.								

Commercial Car

I	F	34x3½	36x4	E	W	O	92	65
Walker Vehicle Co., Chicago, Ill.								

Commercial Car

I	F	38x5	38x6	E	W	O	107	65
Walker Vehicle Co., Chicago, Ill.								

Commercial Car

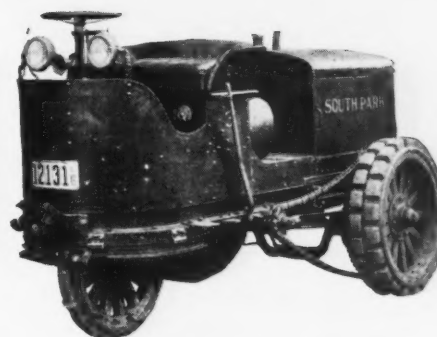
I	F	36x5	38x4D	E	W	O	126	65
Walker Vehicle Co., Chicago, Ill.								

Commercial Car

I	F	36x5	36x6	E	W	O	130	65
Walker Vehicle Co., Chicago, Ill.								

Commercial Car

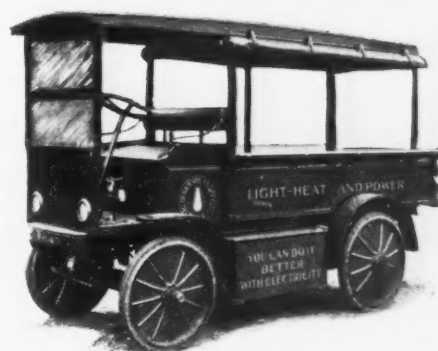
I	F	36x7	38x6D	E	W	O	136	65
Walker Vehicle Co., Chicago, Ill.								



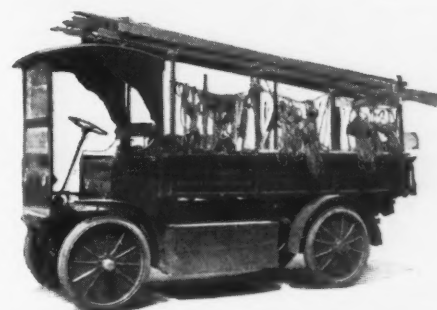
Mercury Bully Gasoline Tractor.



Walker Model M, 1000-lb. Special.



Walker Model K, 1-ton Covered Flareboard.



Walker Model L, 2-ton Covered Flareboard.



Walker Model D, 3-ton Special Body.

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Mercury Model Z, Tractor, \$1580.



Mercury Model X, Tractor, \$2065.

Electric Tractors

Model	Weight	Chassis Price	Maximum Speed	Battery	Mileage per Charge	Motor	Controller	Speeds Forward
Mercury Mfg. Co., Chicago, Ill.								
Z	2150	1580	..	ED	..	GE	O	3
X	3055	2065	..	ED	..	GE	O	3
U	6450	4075	..	ED	..	GE	O	3
Buda Co., Chicago, Ill.								
TW	2600	....	7	ED	..	..	..	3
Walker Vehicle Co., Chicago, Ill.								
2	5000	10	ED	20	WS	WS	5
3	6000	8	ED	30	WS	WS	5
5	6500	8	ED	30	WS	WS	5

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Buckeye Mfg. Co.	20, 22, 24, 28
Cadillac Auto Truck Co.	22, 28, 32
Champion Motor Car Co.	20
Chicago Pneumatic Tool Co.	22, 24, 28
Columbia Motor Truck & Trailer Co.	28
Commerce Motor Car Co.	20, 22
Continental Truck Mfg. Co.	24, 30, 32
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Dart Motor Truck Co.	20, 22, 28
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De Martini Motors Truck Co.	22, 24, 30, 32
Denby Motor Truck Co.	22, 24, 28, 30
Diamond T Motor Car Co.	22, 24, 28, 32, 34
Dispatch Motor Truck Co.	20
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Federal Motor Truck Co.	22, 24, 28, 32, 34
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Lincoln Motor Truck Co.	24
Manly Motor Corp.	26, 32
Master Motor Truck Co.	28
Maxwell Motor Co.	20
Menominee Motor Truck Co.	22, 26, 28, 34
Mills-Ellsworth Co.	20
Jos. W. Moon Buggy Co.	20, 26
Moreland Motor Truck Co.	22, 24, 26, 32, 34
Nash Motors Co.	22, 26, 28
Nelson & Le Moon	24, 28, 32, 34
Packard Motor Car Co.	24, 26, 32, 34
Packet Motor Car Mfg. Co.	20
Palmer-Meyer Motor Car Co.	24, 30
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Reo Motor Car Co.	22, 30
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Maker	Page
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Sheridan Commercial Car Co.	20
Signal Motor Truck Co.	24, 26, 30, 34
Standard Motor Truck Co.	30, 32, 34
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Stegeman Motor Car Co.	26, 32, 34
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500 Pound Commercial Cars.			
Price Cyl. H.P.	Maker	Page	
320 2 9	Harley-Davidson Motor Co.	20	
600 Pound Commercial Cars.			
Price Cyl. H.P.	Maker	Page	
325 4 12	Packet Motor Car Mfg. Co.	20	
750 Pound Commercial Cars.			
Price Cyl. H.P.	Maker	Page	
700* 4 16	Briscoe Motor Corp.	20	
900 4 23	Buckeye Mfg. Co.	20	
800 Pound Commercial Cars.			
Price Cyl. H.P.	Maker	Page	
850* 4 20	Inter-State Motor Co.	20	
1000 Pound Commercial Cars.			
Price Cyl. H.P.	Maker	Page	
650* 4 16	Corliss Motor Truck Co.	20	
695 4 29	Champion Motor Car Co.	20	
695 4 17	Mills-Ellsworth Co.	20	
850 4 20	Jos. W. Moon Buggy Co.	20	
850 4 24	Studebaker Corp. of America	20	
1490 4 16	Sheridan Commercial Car Co.	20	

1500 Pound Commercial Cars			
Price Cyl. H.P.	Maker	Page	
750 4 17	Republic Motor Truck Co.	22	
750* 4 20	Republic Motor Truck Co.	22	
875 4 20	Commerce Motor Car Co.	20	
925 4 27	Reo Motor Car Co.	20	
965 4 23	Nash Motors Co.	22	
1075 4 17	Lane Motor Truck Co.	22	
1100 4 23	Dispatch Motor Truck Co.	20	
1125 4 23	Buckeye Mfg. Co.	20	
1150 4 20	General Motors Truck Co.	20	
1150 4 20	Wm. Landshaft & Son	22	
1200 4 20	Dart Motor Truck Co.	20	
1225 4 20	International Harvester Corp.	20	
1290 4 20	Moreland Motor Truck Co.	22	
1295 4 23	Menominee Motor Truck Co.	22	
1600 4 24	Kleiber & Co.	20	

1 Ton Commercial Cars.			
Price Cyl. H.P.	Maker	Page	
950 4 20	Beck & Son	22	
975 4 20	Lincoln Motor Truck Co.	24	
1095 4 20	Republic Motor Truck Co.	24	
1120 4 16	Denby Motor Truck Co.	22	

Price Cyl. H.P.	Maker	Page
1175 4 20	Commerce Motor Car Co.	22
1200 4 24	Studebaker Corp. of America	24
1250 4 20	Wm. Landshaft & Sons	22
1350 4 17	Wichita Falls Motor Co.	24
1375 4 20	Service Motor Truck Co.	24
1385 4 20	Independent Motors Co.	22
1450 4 20	Chicago Pneumatic Tool Co.	22
1500 4 26	Buckeye Mfg. Co.	22
1500 5 20	Chicago Pneumatic Tool Co.	22
1500 4 20	Federal Motor Truck Co.	22
1500 4 20	International Harvester Corp.	22
1500 4 23	Moreland Motor Truck Co.	24
1550 4 20	Diamond T Motor Car Co.	22
1550 4 23	Signal Motor Truck Co.	24
1550 4 37	Zeitler & Lamson Motor Truck Co.	24
1575 4 20	Cadillac Auto Truck Co.	22
1575 4 23	Menominee Motor Truck Co.	22
1650 4 20	Forschler Motor Truck Mfg. Co.	22
1650 4 20	Wichita Falls Motor Co.	24
1700 4 22	Available Truck Co.	22
1700 4 23	Nelson & Le Moon	24
1800 4 23	General Motors Truck Co.	22

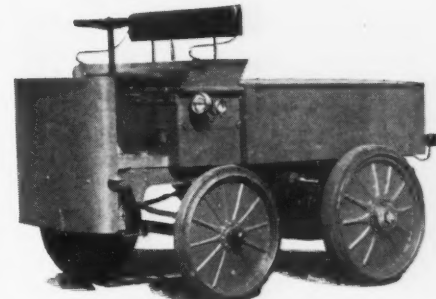
LAST HALF OF REVIEW. FIRST HALF WAS IN THE JANUARY ISSUE

Electric Tractors

Final Drive	Rear Axle	Front Tires	Rear Tires	Rims	Steering Gear	Driver's Seat	Wheelbase	% Total Weight on Rear Wheels
Mercury Mfg. Co., Chicago, Ill.								
W	F	15x3½	20½x3½	O	L	L	40½	85
W	F	16x3	20x3½	O	L	L	38	80
W	F	22x3½	27¾x4½	O	L	L	63	78
Buda Co., Chicago, Ill.								
W	T	16	20	..	..	..	41	..
Walker Vehicle Co., Chicago, Ill.								
O	O	34x3½	38x5	E	R	..	52	75
O	O	34x4	38x6	E	R	..	70	75
O	O	38x4	38x5D	E	R	..	90	85



Mercury Type U, Tractor, \$4075.



Walker Model 3, Tractor

BODY DETAILS OF CARS NOT ILLUSTRATED

Mercury Model A, Tractor, \$3400.

Buda Type T W, Tractor Truck.

Gasoline and Electric Commercial Cars Indexed According to Chassis Price (Continued From Page 38)

Price Cyl. H.P.	Maker	Page	Price Cyl. H.P.	Maker	Page	Price Cyl. H.P.	Maker	Page
1850 4 23	Dart Motor Truck Co.	22	2100 4 27	Signal Motor Truck Co.	30	3000 4 29	Service Motor Truck Co.	34
1865 4 20	De Martini Motors Truck Co.	22	2100 4 20	Wichita Falls Motor Co.	30	3000 4 32	Signal Motor Truck Co.	34
1¼-Ton Commercial Cars.			2200 4 27	Cadillac Auto Truck Co.	28	3000 6 34	Stegeman Motor Car Co.	34
Price Cyl. H.P.	Maker	Page	2240 4 27	Menominee Motor Truck Co.	28	3250 4 29	Harvey Motor Truck Co.	32
890 4 20	Paragon Motor Truck Co.	24	2250 4 27	Available Truck Co.	26	3250 4 32	Sandow Motor Truck Co.	34
1125 4 20	Beck & Son	24	2250 4 27	Forschler Motor Truck Mfg. Co.	28	3250 4 32	Service Motor Truck Co.	34
2200 4 26	Packard Motor Car Co.	24	2250 4 27	Nelson & Le Moon	28	3250 4 32	Wichita Falls Motor Co.	34
1½-Ton Commercial Cars.			2250 4 27	Service Motor Truck Co.	30	3250 4 36	Zeitler & Lamson Motor Truck Co.	34
Price Cyl. H.P.	Maker	Page	2250 4 27	United Motors Co.	30	3350 4 32	Velle Motor Vehicle Co.	34
1275 4 23	Republic Motor Truck Co.	26	2250 4 27	Velle Motor Vehicle Co.	30	3400 4 32	Packard Motor Car Co.	34
1300 4 23	Hawkeye Mfg. Co.	26	2325 4 27	Diamond T Motor Car Co.	28	3475 4 32	Diamond T Motor Car Co.	32
1500 4 20	Chicago Pneumatic Tool Co.	24	2350 4 27	Sandow Motor Truck Co.	30	3500 4 32	General Motors Truck Co.	32
1515 4 23	Nash Motors Co.	26	2350 4 27	J. C. Wilson Co.	30	3500 4 32	Kleiber & Co.	34
1575 4 20	Denby Motor Truck Co.	24	2400 4 27	Kleiber & Co.	28	3600 4 29	De Martini Motor Truck Co.	32
1600 4 23	Jos. W. Moon Buggy Co.	26	2470 4 29	Dart Motor Truck Co.	28	4300 4 32	Available Truck Co.	32
1650 4 20	Forschler Motor Truck Mfg. Co.	24	2500 4 36	Avery Co.	28	4-Ton Commercial Cars.		
1650 4 19	Viall Motor Car Co.	26	2500 4 27	Chicago Pneumatic Tool Co.	28	Price Cyl. H.P.	Maker	Page
1775 4 23	Menominee Motor Truck Co.	26	2550 4 27	General Motors Truck Co.	28	2800 4 36	Acme Motor Truck Co.	34
1800 4 27	Federal Motor Truck Co.	24	2850 4 32	Standard Motor Truck Co.	30	3025 4 32	Standard Motor Truck Co.	34
1800 4 23	Manly Motor Corp.	26	2900 4 29	Nash Motors Co.	28	3600 4 36	Moreland Motor Truck Co.	34
1800 4 27	Signal Motor Truck Co.	26	3400 4 26	Universal Service Co.	30	4½-Ton Commercial Cars.		
1800 4 20	Wichita Falls Motor Co.	26	2½-Ton Commercial Cars.			Price Cyl. H.P.	Maker	Page
1850 4 20	Continental Truck Mfg. Co.	24	Price Cyl. H.P.	Maker	Page	3800 4 32	Packard Motor Car Co.	34
1900* 4 33	Buckeye Mfg. Co.	24	1475 4 29	Beck & Son	30	5-Ton Commercial Cars.		
1900 6 29	Stegeman Motor Car Co.	26	1875 4 26	Union Motor Truck Co.	32	Price Cyl. H.P.	Maker	Page
1950 4 27	Service Motor Truck Co.	26	2000 4 25	Continental Truck Mfg. Co.	30	3200 4 40	Viall Motor Car Co.	36
1950 4 23	Universal Service Co.	26	2090 4 23	Denby Motor Truck Co.	30	3400 4 32	Standard Motor Truck Co.	34
1950 4 26	Zeitler & Lamson Motor Truck Co.	26	2250 4 27	Forschler Motor Truck Mfg. Co.	30	3500 4 32	Standard Motor Truck Co.	34
2000 4 23	Diamond T Motor Car Co.	24	2250 4 26	Manly Motor Corp.	32	3600 4 32	Lewis-Hall Iron Works	34
2000 4 27	Sandow Motor Truck Co.	26	2450 4 27	Wichita Falls Motor Co.	32	3850 4 32	Wichita Falls Motor Co.	36
2100 4 23	General Motors Truck Co.	26	2450 4 26	De Kalb Wagon Co.	30	3900 4 36	United Motors Co.	36
2100 4 27	Moreland Motor Truck Co.	26	2500 4 29	Zeitler & Lamson	32	4000 4 32	Harvey Motor Truck Co.	34
2150 4 27	Star Carriage Co.	26	2500 6 29	Harvey Motor Truck Co.	30	4000 4 32	Service Motor Truck Co.	34
2250 4 27	Kleiber & Co.	26	2650 6 29	Stegeman Motor Truck Co.	32	4000 4 32	Signal Motor Truck Co.	34
2400 4 23	De Martini Motors Truck Co.	24	2750 4 27	Kleiber & Co.	30	4000 6 34	Stegeman Motor Truck Co.	34
1¾-Ton Commercial Cars.			2750 4 32	Moreland Motor Truck Co.	32	4100 4 32	General Motors Truck Co.	34
Price Cyl. H.P.	Maker	Page	2800 4 26	De Martini Motor Truck Co.	30	4150 4 41	Zeitler & Lamson Truck Co.	36
2500 4 26	Packard Motor Car Co.	26	2800 4 26	Packard Motor Car Co.	32	4200 4 32	Nelson & Le Moon	34
2-Ton Commercial Cars.			3-Ton Commercial Cars.			4250 4 36	Moreland Motor Truck Co.	34
Price Cyl. H.P.	Maker	Page	Price Cyl. H.P.	Maker	Page	4300 4 32	Diamond T Motor Car Co.	34
1390 4 23	Fargo Motor Car Co.	28	2500 4 26	Avery Co.	32	4400 4 32	Available Truck Co.	34
1600 4 27	Wm. Landshaft & Son	28	2550 4 27	Republic Motor Truck Co.	32	4500 4 44	Avery Co.	34
1650 4 27	Reo Motor Car Co.	30	2750 4 32	Standard Motor Truck Co.	32	4500 4 44	Kleiber & Co.	34
1675 4 27	Republic Motor Truck Co.	30	2800 4 26	Universal Service Co.	32	4500 4 36	Sterling Motor Truck Co.	36
1750 4 27	Columbia Motor Truck & Trailer Co.	28	2950 4 32	Nelson & Le Moon	32	6-Ton Commercial Cars.		
1790 4 23	Denby Motor Truck Co.	28	3200 4 26	Avery Co.	32	Price Cyl. H.P.	Maker	Page
1800 4 29	Viall Motor Car Co.	30	4000 4 36	Four Wheel Drive Auto Co.	32	4750* 4 36	Doane Motor Truck Co.	36
1850 4 27	Independent Motors Co.	28	3½-Ton Commercial Cars.			7-Ton Commercial Cars.		
1875 4 32	Kissel Motor Car Co.	28	Price Cyl. H.P.	Maker	Page	Price Cyl. H.P.	Maker	Page
1890 4 29	Master Motor Truck Co.	28	2500 4 35	Continental Truck Mfg. Co.	32	3600 4 32	Lewis-Hall Iron Works	36
1990 4 31	Dorris Motor Car Co.	28	2775 4 32	Menominee Motor Truck Co.	34	4750 4 36	Sterling Motor Truck Co.	36
2000 4 27	Lewis-Hall Iron Works	28	2800 4 32	Cadillac Auto Truck Co.	32	Tractors.		
2000 4 27	Standard Motor Truck Co.	30	2800 4 32	Federal Motor Truck Co.	32	Price Cyl. H.P.	Maker	Page
2100 4 27	De Kalb Wagon Co.	28	2800 4 32	Lewis-Hall Iron Works	34	1580 Electric	Mercury Mfg. Co.	38
2100 4 27	Federal Motor Truck Co.	28	2800 4 32	Standard Motor Truck Co.	34	2065 Electric	Mercury Mfg. Co.	38
LAST HALF OF REVIEW. FIRST HALF WAS IN THE JANUARY ISSUE			2900 4 32	Sterling Motor Truck Co.	34	6450 Electric	Mercury Mfg. Co.	38
			2900 4 32	United Motors Co.	34			

Proposed Motor Truck Regulations for New York

Endeavors of Interested Associations to Secure a Just Assessment of Trucks and Omnibuses. Some of the Objections Raised

LAST December the Motor Truck Club of America, Inc., submitted a brief to the Motor Truck Registrations Fee Commission of New York State setting forth its opinions with regard to the just determination of these fees. This special Commission was created and empowered by the Legislature of the State of New York to establish a schedule of fees to be charged for motor trucks and omnibuses, with the special provision that in fixing such fees it should classify such motor vehicles upon the basis of the time and extent of their use on the public highways and the relative wear and tear of the public highways by reason of their use thereon.

On the premise that the fees will be proportioned according to the two elements of use and wear and tear, the brief sets forth that vehicles should be exempt that do not use the class of roads to be maintained from the funds collected under the new schedule; then it shows how other vehicles should be classified. It is argued that the factors of weight and load and also of speed must be considered, also that the character of the road has much to do with the rapidity of its wear, and that the regulations as to the use of roads should be enforced, protecting against unnecessarily rapid deterioration.

In submitting the brief the Motor Truck Club requested the Commission to arrange a hearing before finally determining on the new schedule of fees and to announce the proposed schedule in advance, so that suggestions and criticisms might be offered at the hearing. Subsequently the Commission announced that a public hearing would be held December 21, in the Merchants' Association Rooms, in the Woolworth Building, in New York City.

Views Brought Out at Public Hearing

At this meeting Mr. Duffey and Mr. Williams represented the Commission and were accompanied by their consulting engineer, Mr. Wagner.

The meeting opened with a presentation, by the attorney of the Fifth Avenue Coach Co., of a protest against imposing additional fees upon their vehicles whose use is confined entirely to city streets and who are already paying a considerable sum specifically for the purpose of maintaining the condition of streets used by these vehicles, attention being called to the fact that this specific fee amounts to between three and four hundred dollars for each vehicle.

Roderick Stephens, for the Motor Truck Club, requested consideration from the Commission as to the possibility of announcing whatever tentative conclusions it might have reached as to factors which it was considering material to the determination of its schedule of fees and also an an-

nouncement of whatever schedule of fees had been tentatively arrived at. The Commission conferred for some little time in regard to this request and finally announced that it was not prepared to give any information as to amounts to be recommended by it, but that it desired information on the merits of the proposition that trucks with pneumatic tires receive special consideration over those tired with solid rubber. The Commission also announced that it had construed its powers not to apply to semi-trailers or trailers and that no fees would be imposed by it upon such types of vehicles.

Mr. McMahan, attorney for the National Automobile Chamber of Commerce, argued at length on the technical impossibility of carrying out the mandate legislature to the effect that the schedule of fees must be based upon the time and extent of use and wear and tear upon the highways of the state; also that, by reason of the fact that pleasure cars were exempt from other taxation than the present schedule of registration fees, whereas motor trucks were not exempt, the Commission should not impose additional fees upon trucks.

Mr. Stephens argued on the second point with the suggestion that the Commission could file a schedule of fees and carry out the legislature's mandate, but that the schedule of fees should be made reasonable and should not be greater than the present schedule on account of the non-exemption of trucks previously referred to. He also suggested that the Commission might prefer a schedule of fees that would be based upon whatever information it had on the subject of road damage resulting from the use of motor trucks and omnibuses and whatever further information was available as to the average time and extent of use of different classes of motor trucks and recommended to the legislature that a commission be appointed with adequate power and resources to revise or to make a complete study of the problems from all angles and make a report as soon as such information was obtainable with recommendation for a fair and reasonable basis of taxation in the future.

Mr. Johnston, for the Automobile Dealers' Association, argued that the present fees represented the basis of taxation agreed to after several years of study and discussion and compromise, and that no new condition warranted any increased fees for motor trucks.

Alfred Reeves, of the National Automobile Chamber of Commerce, answered a question of Mr. Williams regarding the probable maximum load capacity of motor trucks by saying that it was their belief that 28,000 lbs. would practically cover the maximum weight of vehicle and loads that

would prove an economic possibility for the future. On being questioned as to this representing their idea of the maximum load for four-wheel self-contained trucks, or whether he was including semi-trailers within the weight limit, he stated that this applied only to four-wheel vehicles.

A. J. Slade, of the Society of Automobile Engineers, spoke of the discussions that had already been held by that Society in regard to the possibility of arriving at a scientific determination of the factors of road wear resulting from the use of trucks of various types, the possibility of evolving therefrom a formula for general application and offered to place at the disposal of the Commission a complete report of the discussion and studies of the various committees to whom this subject had been referred.

Others who spoke were D. E. Dealey, of the Warehousemen's Association; Joseph Husson, of the Commercial Vehicle and editor of the Motor Truck Club Bulletin, and Mr. O'Brien, of the Horton Ice Cream Co.

The Commission announced that it would file its schedule on January 1, with the Secretary of State.

The Proposed Schedule of Rates

The revised rates went into effect February 1.

The findings of the committee, given herewith, are along the lines of the New Jersey bill insofar as taxation is considered. In some instances the New York rates are five or more times the present or rather past rate of \$5 flat.

The combined weight of the truck and its carrying capacity has been used as a basis by the commission in determining the rate of tax. The fees referred to are annual.

Two tons or less	\$10
More than 2 and not more than 3....	15
More than 3 and not more than 4....	20
More than 4 and not more than 5....	25
More than 5 and not more than 6....	30
More than 6 and not more than 7....	35
More than 7 and not more than 8....	40
More than 8 and not more than 9....	45
More than 9 and not more than 10....	50
More than 10 and not more than 11....	55
More than 11 and not more than 12....	60
More than 12 and not more than 13....	65
More than 13 and not more than 14....	70

Vehicles in excess of 14 tons are to be charged \$10 for each additional ton.

Motor vehicles used as omnibuses for transporting passengers are to be taxed according to their seating capacity, and as follows: Five passengers or less, an annual fee of \$15; 6 to 7 inclusive, \$24.50; 8 to 10 inclusive, \$30.50; 11 to 16 inclusive, \$43; 17 to 20 inclusive, \$52; 21 to 22 inclusive, \$55; 23 to 26 inclusive, \$61.50; 27 to 30 inclusive,

\$67.50. For each passenger in excess of 30 a fee of \$2 for each passenger is to be imposed. If any motor vehicle used for transporting passengers, and for which a fee is herein provided, is originally registered after August 1 in any year, the fee for that year shall be one-half.

A Little Hope for Reconsideration

Since the ratification of the Hewitt-Wells bills and their signing by Governor Whitman, establishing this schedule, the Motor Truck Club and users generally have been vigorously protesting and asking for its repeal. The governor held a hearing February 6 at Albany, as a result of which it is almost certain that he will appoint a new commission to determine a new schedule of fees. It was urged at this meeting that the new highway commission consist of a motor truck engineer, a highway engineer and a State engineer.

The repeal of the truck bills will not be granted. Truck users will have to pay this year's fees at the new rate unless the commission to be appointed should determine upon its new rate before the end of the year. Then it is possible that a pro-rata share of the 1917 fees may be returned. All 1917 fees should be paid under protest.

SNOW PLOW AND BUMPER COMBINED

The motorist need not stay at home on account of deep snow if he will make use of a newly-invented device that may be readily attached to his pleasure car. It consists of two plows attached to a bumper and running on steel skids before each front wheel. These clear a track of just sufficient width to allow the car to travel with ease over roads that would be impassable otherwise. On account of the narrow space to be cleared of snow, it is possible to get the desired result with the use of little power, for it is not designed primarily to remove the fall from the entire roadway, but only to make way for the machine that uses it. This of course is sufficient for country roads which are not extensively traveled. The inventor, Claude L. Hyde, is shown in his machine thus equipped, and as he has tried it out upon roads that were encumbered with deep, hard snow, the device is a proven success. The bumper is intended as a permanent accessory to the car, as the plow is detachable from it, leaving the rest of the mechanism to serve as an ordinary bumper. This device is put out by Claude L. Hyde, of Otisville, N. Y. It is applicable to both pleasure and commercial cars.

AUTOCAR SERVICE KIT FACILITATES REPAIRING

The Autocar service kit has been developed to meet a demand that came from two sources. In the first place more and more Autocars are being sold in country districts and in localities far removed from a possible service station. In the second place there are many fleets of Autocars being sold, and in most cases these fleet owners have established their own repair departments.

This kit is furnished by the Autocar Co., of Ardmore, Pa., and contains an assortment of parts which are considered to be



The Autocar Service Kit

The chest is furnished free. Any or all of the unused parts are returnable at any time in exchange for other parts, credit or cash.

most useful to the Autocar owner. A list of parts comprising the average kit is published. The price of any one kit is the sum of the parts in that list. The box itself is of special construction and is uniform. No charge is made for the box.

A special feature of this service is the fact that any or all of the parts are returnable at any time for other parts, for credit or for cash. This makes the cost of the kit in reality only the interest on carrying the investment and the actual cost of the parts used. The company believes that this small cost is the most reasonable insurance that a truck owner can buy against what might be a very serious loss from having a truck laid up for want of a spare part.

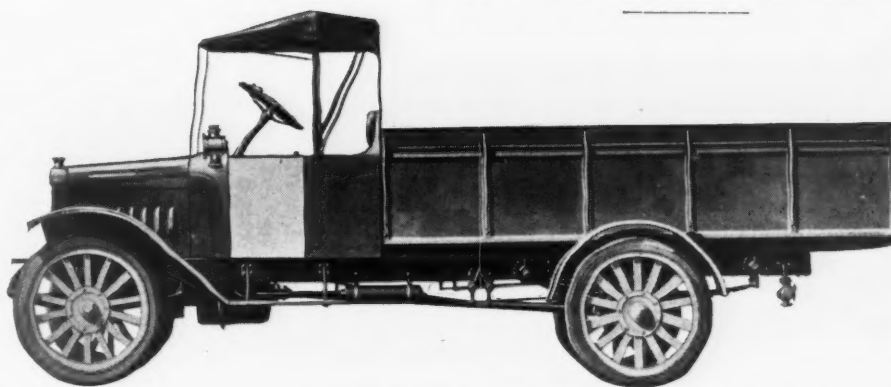


Snow Plow Attached

This illustration shows the snow plow and bumper attached to a pleasure car, although it is applicable to commercial cars as well.

RHODE ISLAND INCREASES LICENSE FEES

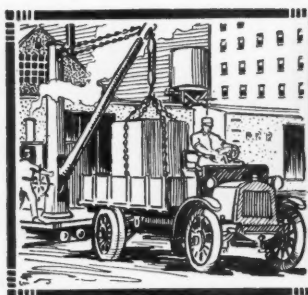
All vehicles in Rhode Island must now be lighted ½ hour after sunset and remain so until ½ hour before sunrise when on the roads. There has been a change in the registration law and instead of cars being registered from the date on which the fee was paid, all registrations now begin January 1st and end December 31st, as in many other States. Under the old law all cars under 20 h.p. were taxed \$5; from 20 to 30 h.p., \$10, but now the limit for the \$5 fee is 15 h.p.; from 15 to 30 h.p., \$10. Commercial cars were rated at a flat rate of \$7 under the old law; they are now to be graded according to tonnage, ranging from \$7 for 1 ton and under to \$40 for 9 tons or more.



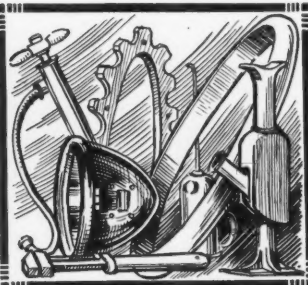
New Bethlehem Truck

This is the one and a quarter ton Bethlehem truck with open express body, which is sold as shown, at \$1165 f.o.b. Allentown. It is made by the Bethlehem Motors Corporation, of Bethlehem, Pa.

Merit wins—that's why the CCJ is the leader



TRUCK ACCESSORIES AND APPLIANCES



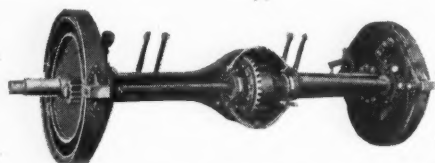
TORBENSEN INTERNAL-GEAR TWO-TON AXLE—TYPE "C"

The new two-ton Torbensen Drive Axle, type "C," manufactured by the Torbensen Axle Co., 152nd Street, Cleveland, O., follows closely the design of the former models that are now in service. It is built to carry a 2-ton load, with capacity for overload.

As in all former models a solid member is supplied to carry the load and a separate one to transmit the power to the wheel. The jackshaft or power transmitting axle is securely attached to the load carrying axle. It is relieved of load stress and is for the purpose of propulsion. The driving mechanism is enclosed, affording cleanliness and a degree of quiet working and efficient lubrication.

The mounting of the differential in the type "C" is unique. In the first place, this unit is fitted securely into the expanded I-beam center.

The jackshaft assembly is a flexible structure. This flexibility is secured by loosely fitting the ends of the jackshaft tubes in the differential housing, leakage being prevented by broad felt washer packings. This construction furnishes flexible joints



Torbensen Axle—Type "C"

The above shows the axle partly encased and furnished with its corresponding parts

at four points and acts to prevent destructive action to the bearings and differential unit, due to any flexing of the I-beam when under heavy load.

The Torbensen solid I-beam rear axle has one function to perform and that is to support the load. It is forged in one piece from a .40 carbon steel billet and after the forging is completed, it is given a double heat treatment, claimed to increase its toughness and dependability.

Block bearings are used for the differential and driving shaft, while Bower bearings are used in the hubs and at the ends of the jackshafts.

The model "C" is made up with the gear ratio of 8:1, 9:1 and 10.3:1, but either lower or higher ones may be had when necessary.

The brakes are readily adjusted. Service brakes of the external contracting type and emergency brakes of the internal cam ex-

panded type operating on pressed steel drums are used. As these are located on the driving wheels they are said to relieve the transmission of the strains put upon it as is the custom when the chain drive is used. In connection with the brakes, model "C" shows an improvement in the method of keeping them free from grease. This consists of a curved shield extending over the edge of the internal gear. Against the face



Torbensen Axle—Type "C" Stripped

of the latter bears the edge of an annular felt ring which is not only reputed to exclude dust or moisture that may find its way into the interior of the brake from entering the enclosure of the driving gears, but also to keep the grease from getting out. Surplus grease that may escape the felt packing is caught in the grease shield and drained off through an opening provided for it, thus keeping the brakes dry and free from grease.

STEVENSON WORM-DRIVE TRUCK ATTACHMENT FOR FORDS

A worm-driven truck-forming unit for Ford cars is being put on the market by the Stevenson Truck Attachment Co., East Orange, N. J. The illustration gives a general idea of the appearance of the converted Ford chassis in shape to receive a commercial body of whatever sort may be wished.

The frame of the attachment is 4 in. channel iron, 160 in. long over all and reinforced. The gear ratio of the worm driven axle is 7.2:1. Semi-elliptic springs of

ten leaves each, $2\frac{1}{2} \times 42$ in., take the place of the old transverse spring.

The drive is through the springs, no torsion or radius rods being used, from a tubular shaft with a Spicer universal joint. The wheels are artillery type with 2 in. spokes and the tires, solid rubber, 32 in. diameter by $3\frac{1}{2}$ in. across. The brakes are $2\frac{1}{4}$ in. internal expanding. The wheelbase is 125 in. when attached to the Ford frame and the tread 56 in. By itself the attachment weighs 1200 lbs., but in combination with the Ford chassis the complete weight is about 2150 lbs. Ready to attach, the unit is sold for \$425 f.o.b. East Orange, N. J.

The company will apply the attachment free of charge if it retains the unused Ford parts, otherwise there is a charge of \$15 to those who have the unit attached by the Stevenson Co.

BERG COTTER-PIN PULLER

This handy tool, made by G. A. Berg & Co., of 3719 North Central Park Avenue, Chicago, Ill., is used to remove all size cotter pins in inaccessible places and will not slip or break the cotter pin head. The



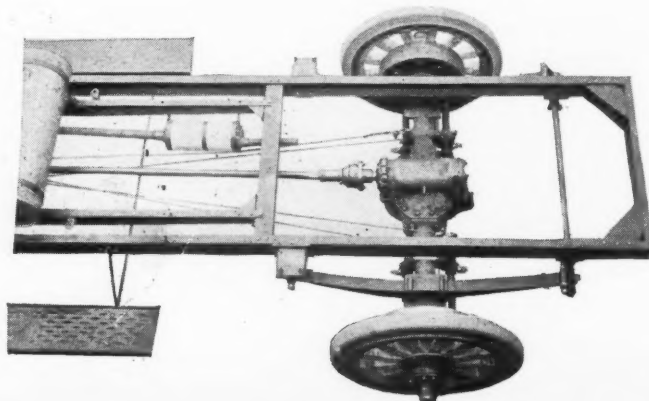
Berg Cotter-Pin Tool

hook is tapered to accommodate large and small pins and can also be used to spread the pins when inserted. The handle slides on the shank so that the pins are removed by a sudden pull, the force of the handle hitting the shank head being sufficient to remove any pin. The price of this tool is \$1.75.

L. M. COTTON, INC., Boston, Mass., has the New England territory for the Ohio two and four-wheel trailers, manufactured by the Ohio Trailer Co., Cleveland, Ohio

Stevenson Truck Attachment

Illustration shows an earlier assembly than the present, which has an Empire axle and Ford foot-brake.



MILLER DEMOUNTABLE CUSHION PAD FOR TRUCK TIRES

MOUNTING or removing truck tires on the road, at the garage, or whenever necessary and without the use of special presses and tools is possible with the new Miller demountable cushion pad for truck tires, made by the Miller Rubber Co., of Akron, Ohio.

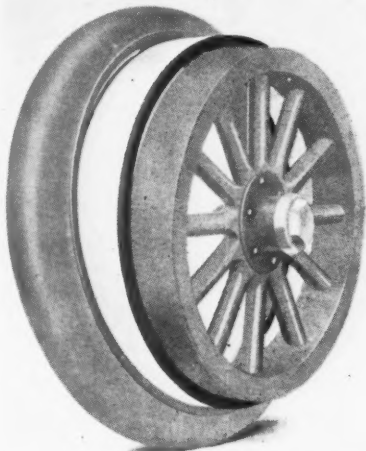
Briefly, this device consists of a single strip of soft but tough resilient rubber, $\frac{7}{8}$ in. thick and as wide as the rim it is required to fit.

On both the outer and inner edges of this circumferential pad is a steel flange. In these flanges a series of twelve bolt holes are drilled to correspond with holes in the rubber pad. The bolts when inserted hold the pad in place, and as the bolt nut heads are tightened, the rubber is evenly compressed by the lateral pressure of the steel flanges, and bulges out as shown by one of the accompanying illustrations.

The cushion pad fits between the steel tire base and the steel S. A. E. felloe band. When the nuts are tightened the rubber is

and any "pressed on" type of tire can be applied or removed by hand. It is unnecessary to remove the wheels of the truck to apply or demount the tires, and an extra wheel need not be carried.

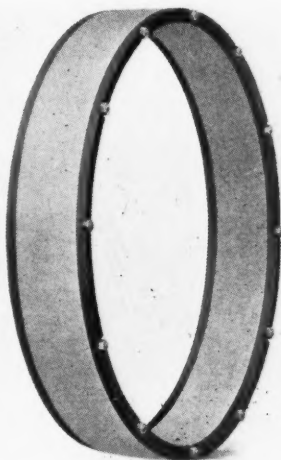
The use of this cushion pad does not require any alteration in the wheels of the truck. Since the pad, however, is $\frac{7}{8}$ in. thick, it necessitates using a tire 2 in. greater in diameter. For instance, if a 36 in. size is on the truck, it is necessary to equip with a 38 in. tire, etc. The use of



The Miller Demountable Cushion Pad Being Inserted

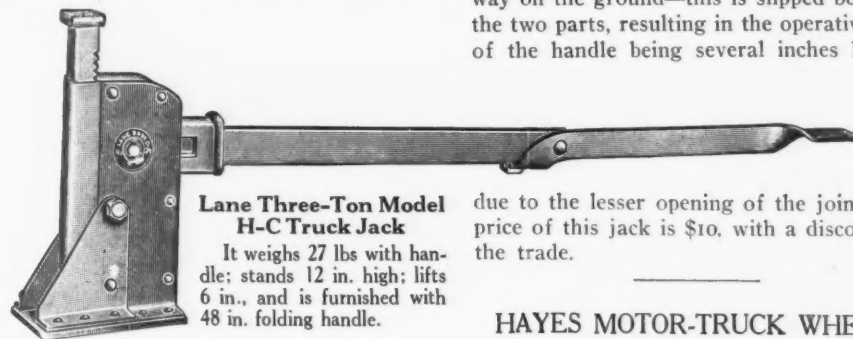
The pad fits between the steel base of the tire and the steel felloe band. It puts rubber against steel.

a larger size tire has in itself so many advantages that the slightly greater cost of larger tires (average \$1.50 per wheel) is



The Miller Demountable Cushion Pad
The simplicity of this device is noteworthy

forced up in the center until it comes into firm and even contact with the tire base and felloe band. The amount of contact or pressure depends entirely upon the number of turns given to each nut. The terrific pressure that the compressed rubber exerts



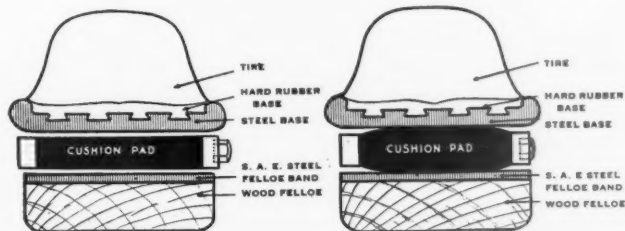
Lane Three-Ton Model H-C Truck Jack

It weighs 27 lbs with handle; stands 12 in. high; lifts 6 in., and is furnished with 48 in. folding handle.

more than repaid by the corresponding greater mileage received and in the truck's increased load-carrying capacity.

Diagrammatic View Showing Action of Cushion Pad

The illustrations are self-explanatory. The pad is made in sizes to fit any wheel.



against both tire base and felloe band holds the tire on with an unshakable grip. The pressure exerted is so great that the tire cannot possibly creep on the rim, and lost motion is eliminated completely.

This Miller pad will fit any S. A. E. wheel (using either dual or single tires),

This device enables one to demount a tire quickly, and the only tools required are a pocket wrench and a pair of hands.

Besides the quick demountable feature the Miller cushion pad also acts as a shock absorbing device and adds many miles to the life of the tire.

LANE'S THREE-TON H-C TRUCK JACK

The Handle Control Auto Jack brought out last season by Lane Bros., of Poughkeepsie, N. Y., has resulted in a demand for a similar jack for commercial car use, hence the manufacturers have responded with the 3-ton size.

The jack was exhibited at the recent New York and Chicago Auto Shows, and is said to be somewhat different from the pleasure car sizes in both design and interior mechanism, though the operating functions are the same. The distinguishing feature is the great length of handle and the ability of the operator to manipulate the jack entirely from the outer end of the handle. As in the smaller sizes of the Lane H-C jacks, the handle is securely held into the socket by a spring catch, and reversal of the jack is accomplished by a lengthwise twitch on the handle.

Thus in operation the handle is first unfolded and pushed into the socket as far as it will go. This sets the mechanism for raising. The jack is then shoved under the load by means of the handle. The extremely long handle now extends away back and clear from all parts of the vehicle so that the operator can work to advantage and in safety. The usual pumping motion raises the lifting bar.

To set the jack mechanism for lowering, the handle is twitched backward (it moves $\frac{1}{2}$ in. in socket) after which pumping as before lowers the rack bar notch by notch. A locking device is provided in connection with the handle joint. This is for holding it rigidly open when in use, but in the event of an obstruction—such as a stone in the way on the ground—this is slipped between the two parts, resulting in the operative end of the handle being several inches higher

due to the lesser opening of the joint. The price of this jack is \$10, with a discount to the trade.

HAYES MOTOR-TRUCK WHEELS

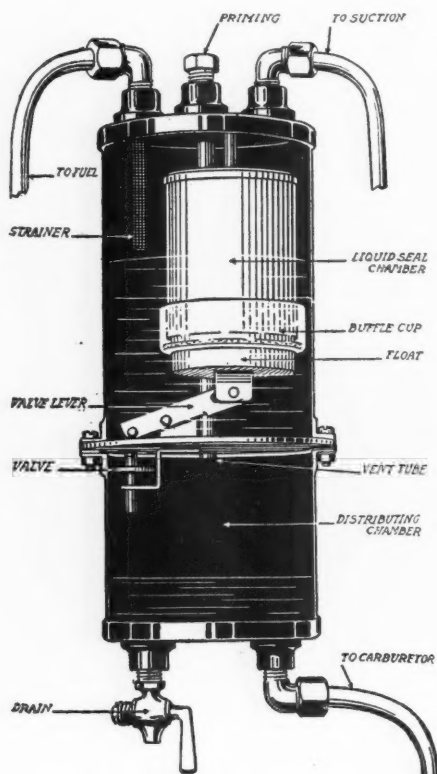
With the constant increase in commercial car production the Hayes Motor Truck Wheel Co., of St. Johns, Mich., has experienced an increasing demand on its motor truck wheel department. This department is a complete factory in itself, and is equipped with the latest improved and specially designed machinery. This company manufactures truck wheels for light, medium and heavy duty work and is in a position to handle any motor truck wheel proposition. This company manufactures a strictly high class product, using only the best hickory, carefully matched and carefully assembled by technically skilled mechanics.

ELDRIDGE MFG. CO., Boston, Mass., manufacturer of motor trucks, had a petition in bankruptcy filed by the following concerns: Philadelphia Storage Battery Co., W. P. Stone & Co. and the Boston Armature Works.

HECO VACUUM FUEL SYSTEM

One of the latest additions to the line of Heinze Electric Co., of Lowell, Mass., is the Heco vacuum fuel system. This system is operated by suction from the intake manifold. It is embodied in a small tank, preferably placed under the hood, and located between the main gasoline tank and the carburetor. The engine suction draws the fuel from the main gasoline tank to the Heco tank, and from the latter tank the fuel flows by gravity to the carburetor.

The Heco tank has an upper and a lower chamber. The upper chamber is the operating chamber, containing the control mechanism. The lower chamber is the distributing chamber, constantly feeding the carburetor. The upper chamber is connected by tubing to the main gasoline tank and to the intake manifold. The lower chamber is connected to the carburetor. There is a partition separating the chambers, to which



Section of the Heco Vacuum Tank

both are bolted at their flanges. On this partition is mounted the valve mechanism. There is but one valve, and that is mechanically operated. This valve controls the connection between the upper chamber and lower chamber. It is connected to a lever, which in turn is operated by a float. When the float is down, the valve is closed. An inverted cup is mounted in the upper chamber, and surrounds the float. This cup controls the positive action of the float by trapping and retaining suction by the action of the liquid which periodically seals its lower and open end; therefore, the name "liquid seal chamber." The lower chamber is connected to the atmosphere by a vent tube, which controls the gasoline level and maintains atmospheric pressure in this chamber. The upper chamber has no communication with the atmosphere except indirectly

through the lower chamber, and then only when the valve has opened communication between the two.

The operation follows: The tank being empty, the float will be down and the valve closed. A partial vacuum will then be caused by the intake suction in the upper chamber, and fuel will flow into that chamber. As the fuel level rises above the lower and open end of the inverted cup the upper chamber will become separated from the liquid seal chamber (inverted cup) by the liquid fuel forming a "liquid seal." Thereafter the fuel will rise higher in the upper chamber than in the liquid seal chamber; but when the level in the liquid seal chamber rises high enough to immerse the float and give it sufficient buoyancy to break open the valve, air will pass the valve from the lower chamber, bubble through the fuel in the upper chamber and thereby reduce the vacuum above the fuel. This increased pressure will force more fuel into the liquid seal chamber and thereby lift the float to its stop. The valve will then be wide open, allowing the fuel to drop to the lower chamber and at the same time allowing air to percolate through the fuel to allow for liquid displacement.

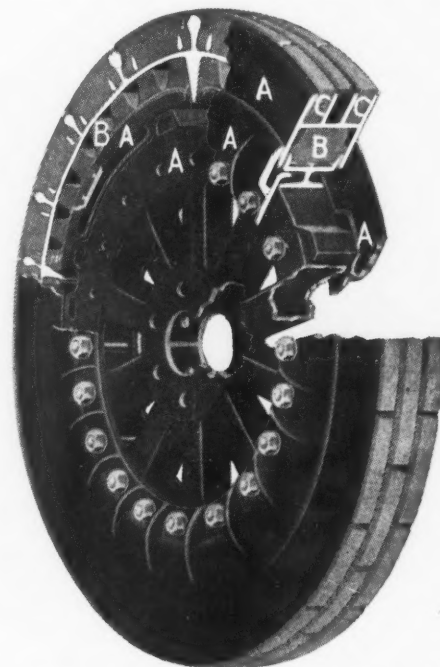
A baffle cup is attached to the float to keep the percolating air from entering the liquid seal chamber and to avoid the breaking of the partial vacuum trapped therein. The fuel will continue to drop to the lower chamber but without disturbing the float, as the float is buoyed up in the liquid seal chamber by the liquid still held there by suction. When the fuel level drops below the float it exposes a hole running up through to break the liquid seal, in turn allowing the liquid to run out and the float to drop and positively close the valve. The process will be repeated until the lower chamber has filled up to the lower end of the vent tube in the upper part of the lower chamber. That point determines the level of fuel in the lower chamber regardless of the level in the upper chamber. The moment the fuel level closes the vent no air can pass up through to the upper chamber, and therefore the fuel can no longer drop to the lower chamber until the consumption of the engine has again lowered the level to admit air to displace another small quantity of fuel from the upper chamber. The fuel level in the lower chamber is therefore practically constant, not varying more than one-sixteenth of an in., which means a constant head or static pressure on the carburetor.

REUTER & Co., brewers of ale, Boston, Mass., report that they used a 5-ton Pierce-Arrow truck for three years for delivery to Lynn. The truck was usually started at 7.30 in the morning, made 25 stops, covering a distance of 30 miles, with detours, on the return trip, and would be back at 5 P. M. In spite of rough going the gasoline used averaged 3.60 miles to the gal. The run was made loaded both ways, bringing back the empties on the return journey. During the period of five years the truck was not out of service five working days.

THE GIANT TRUCK WHEEL

The Giant Truck & Wheel Corp., 137 S. La Salle Street, Chicago, Ill., is manufacturing the Giant truck wheel. The wheel is so constructed of steel, rubber and wood as to give great resiliency and durability. The rubber in wheel does not wear out in the commonly accepted sense of the term, for it is not used for traction or for road contact but only for supplying resiliency, hence will render service until it has lost its "life" by the ordinary process of decomposition. There are no springs or delicate parts, which should make the wheel very durable. The tread, being of wood and steel, will resist injury from hard use and is such as to cause it to stick to the road and to be practically free from tendency to skid.

Most of what is called the hammer blow is absorbed in the outer tread ring of the



Part Section View of the Giant Wheel

Showing the principle of construction and the material used in the various parts: A, steel; B, rubber; and C, wood.

wheel and thus does not reach the springs of the truck, the axle or bearings. The cushion member is inserted into the wheel in sections. Each cushion is vulcanized on a steel sector. The cushion itself is made in toothed formation and encircled with a steel band tread ring, then the hub and spoke section is inserted. This cushion member in the wheel is designed to receive its compression around the entire arc gradually as the wheel revolves and similarly the compression is gradually released as each point comes from under the load.

IN 1914 EXPENDITURES for road improvements in the New England States over those of 1904 ranged from 10 per cent. in Rhode Island to nearly 205 per cent. in Massachusetts according to road statistics and rural engineering of the United States Department of Agriculture. The total for 1914 was \$15,435,766.01 and for 1904, \$7,383,755.70.

For its readers—information; for its advertisers—results. That's the purpose of the CCJ

Monarch Spring Wheel

The Autocraft Co., 126 State Street, Boston, Mass., is manufacturing the Monarch Spring Wheel for use on trucks of all kinds. They are claimed to carry any load over the road at any speed with little vibration to the car. It is simple in construction, with every part direct and positive in its action and is built according to engineering requirements, reducing the effect of rough road conditions on the delicate parts



Shock-Absorbing Spring Wheel

Showing the arrangement of the springs, which act to cushion the drive of the car

of the engine, transmission, differential, etc. There is said to be no deflection or wear of parts under normal load and on level roads, the whole spring system of the wheel being reserved for reducing vibration. That is, the load is so balanced by the springs in the wheel that it operates as an ordinary solid tire wheel when rolling over a smooth surface, yet the wheel is sensitive to every vibration produced in passing over an uneven surface. Incorporated in the wheel is a series of self-contained spring units, which are virtually shock absorbers introduced where the shock absorber should be—between the axle of the vehicle and the ground. The springs are especially designed to guard against breaking.

Evans Truck Attachment

The Evans Truck Mfg. Co., of 1070-72 Penobscot Bldg., Detroit, Mich., is making a 2000-lb. truck attachment for Ford cars. A review of the construction shows that it is built with a heavy pressed steel frame which is doubled so that it fits over and

reinforces the Ford frame. A wheelbase of 135 in. gives rather large loading capacity behind the seat without too much overhang. The wheels have twelve $1\frac{3}{4}$ in. spokes each and are on solid steel axles with adjustable radius rods, furnished with heavy duty roller bearings and sprockets of special treated steel. An auxiliary spring in the rear is designed to overcome vibration when the truck is traveling empty or when carrying a light load up to 500 lbs. Then the load is transferred to the side springs when full capacity is carried. The rear wheels have solid Firestone tires and measure 32 x 4 in., while the front wheels are Standard with chassis. There is a service brake on the rear axle and an emergency on the jack-shaft. A standard tread of 56 in. is claimed to not cut the axle or change it in any way. The net weight of the unit is 875 lbs., and an average speed of 16 to 20 m.p.h. may be attained. The price new is \$675, or the company will install the unit in five hours on a Ford for \$350, body extra.

Parker Rust-Proofing Process

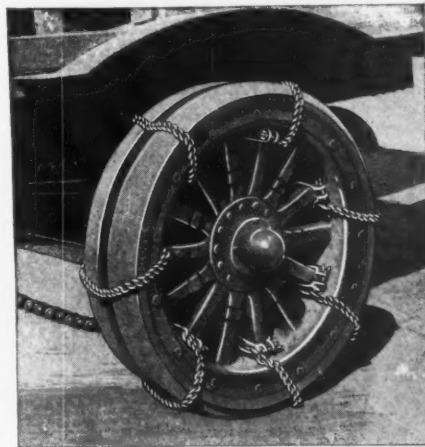
At the Show the exhibit of the Parker Rust-Proof Co., of America, of Detroit, Mich., attracted considerable attention. The specimens of work shown gave mute evidence of the unlimited field to which this process can be applied. Besides the non-corrosive properties that the Parker rust-proofing process gives to the treated materials it also produces a surface which is meshed by microscopic etchings. This is of a distinct advantage if the product is to be japanned or electroplated, due to the marked increase in adhesiveness.

As a result of corrosion such coatings quickly peel off from pieces treated in the usual way. The Parker process practically stops this, due to the closeness of contact between the metal and the veneer, and also to the high rust-resisting properties of the metal.

It is not to be inferred that the Parker processed article requires a coating to give it a pleasing appearance. On the other hand the dull black color and mat texture are very attractive. This process will not increase or decrease the size or contour of an article, internally or externally. In the case of screws, for instance, the pitch is in no way affected. Machined parts, links and mechanical appliances already completely assembled, can be processed without affecting the operation in any way. Incidentally the elasticity of springs is in no way affected by the process.

Anti-Skid Chain for Trucks

The Rowe Calk Co., of Plantsville, Conn., is offering the Prest-O-Grip Anti-Skid chains for all trucks with solid tires, single or dual. Each one of these units consists of the cross chain, which goes around the tire and felloe, the ends of the chain being locked to the clamp upon a spoke by two drop forged links. The chain is made of steel, is tough and strong, and has a special



Prest-O-Grip Anti-Skid Chains

These are made for all sizes of single and dual solid truck tires

twist in the links, so that it will lay flat on the tire. The lock-link is a drop forging and is the means of quickly attaching or detaching the cross chain. The clamp is of malleable iron and lined with rubber to prevent injury to the spokes. Once attached the clamps are left on the spokes so that cross chains can be quickly hooked in place.

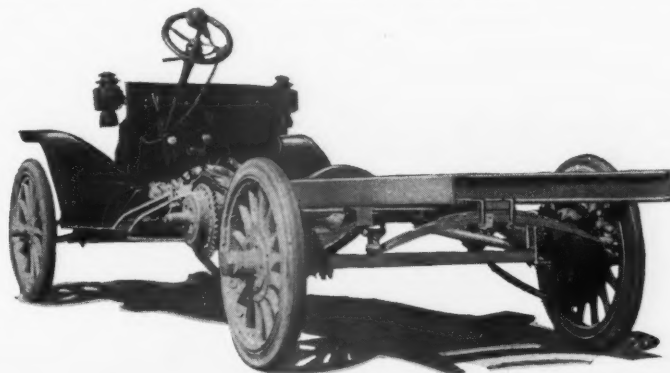


Crowe Mechanical Fan Belt

This fan belt for Ford cars is manufactured by the Mechanical Belt Company, 1202 Frederick Avenue, St. Joseph, Mo. It is a non-skid, ventilated, leather-tread chain belt that runs on the same pulleys as the flat leather belt. It is made of oak leather blocks, built into a steel chain background. The leather blocks furnish the traction, while the chain shoulders the pull. A special connecting link for quick application is furnished. The belt is claimed oil, water, heat and dirt-proof, and sells for \$1.

Rear of Model "E" Evans Truck

Showing the auxiliary spring system with the rear cross beams removed.



THE PHONE-METER

This device is designed primarily for checking long-distance telephone calls. 'Phone statistics show that the average person talks only a minute and a half on a three-minute minimum call. The average subscriber pays for double the time he uses simply because few men can measure time mentally or guess it correctly.

With the Phone-Meter all rush and excitement in long-distance 'phoning is eliminated. It enables one to talk the full three minutes without thinking of possible excess charges.

The Phone-Meter is not unlike a desk clock in appearance. It is $3\frac{3}{4}$ in. high, while the dial measures $2\frac{1}{2}$ in. The dial



The Phone-Meter

A device for timing long-distance phone calls. Puts a check on overcharges.

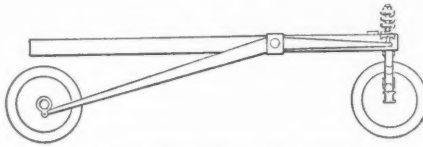
is graduated to minutes and fractional parts of minutes. A red mark is shown below the third minute to remind the user that excess time begins at this point. The Phone-Meter is also used as a check on interruption, as it enables one to stop the time until the connection is restored.

This device is finished in gun-metal, incased tastefully with dark green or red French leather. It is made by the Graves Timing Device Co., 26th and Parkway, Philadelphia, Pa., and lists at \$5.

THE DRABEK EQUALIZER FOR FORDS

This equalizer is a device attached to the car frame and designed to relieve the chassis of all road shocks. It operates on the lever principle, is pivoted near the front end of the frame and extends the entire length of the car frame. The rear end of this device is shackled to the rear axle and the front end compresses the helical springs, these absorbing road shocks. The equalizer is attached to the chassis at one point only approximately one-quarter distant from the

front end of the frame. All vertical movements of the rear wheels, which are attached to the long arms of the lever and which are the main weight carriers, are transmitted to the forward end of the car through the short arm of the lever where the jolt is reduced exactly in proportion to



Drabek Equalizer Principle

Illustration to explain principle of the Drabek Equalizer

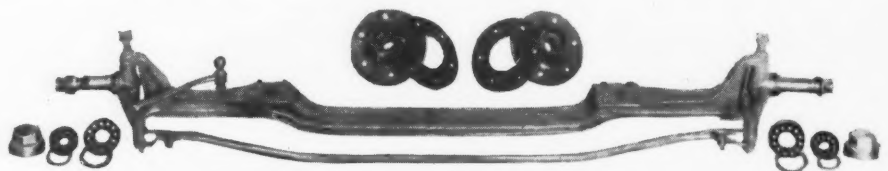
the proportionate length of the arms. In the present instance this is at a ratio of three to one.

Thus if the wheels run over car tracks, cobblestones or other road obstructions which are 1 in. in height, the motion transmitted to the car through the fulcrum and the short arm of the lever is only one-third in., which is easily absorbed by the helical springs at forward end of the short arms. The entire weight is carried on fulcrum and forward springs. The back end rides free "in the air." Undue side sway in the long overhang of the car body rear of the fulcrum point, is cared for by steel straps connecting body to rear axle, these acting also as snubbers.

These equalizers are made for Ford cars only at the present time, but are applicable to all makes and soon will be manufactured for them. This device is applicable to commercial cars as well. It is made by the Drabek Equalizer Co., of Cleveland, Ohio.

ADAMS MODEL "C" FRONT AXLE

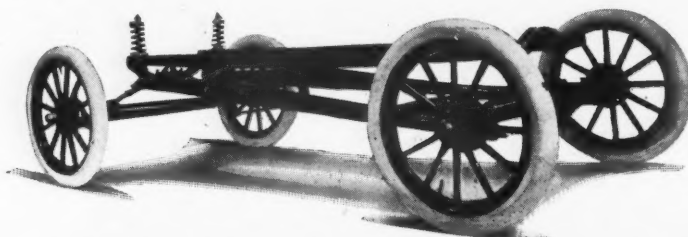
The Adams Truck, Foundry & Machine Co., Findlay, Ohio, is presenting the new Model "C" Front Axle, designed for 2500 lbs. capacity. It is of the I-beam type and is of heat treated forging. The section measures $1\frac{3}{8} \times 2\frac{1}{2}$ in., with a $\frac{1}{4}$ in. web. The spring centers are $28\frac{1}{2}$ in. apart and can be made adaptable to $1\frac{3}{4}$ or 2 in. springs. The size of the yoke in the I-beam is $3\frac{3}{4}$ in., which is furnished with a $\frac{5}{8}$ in. spindle bolt. Hardened and ground knuckles



Adams "C" Front Axle

This shows the Model "C" Front Axle, which is furnished complete with hubs, bearings, hub cap, wrenches, all grease cups and felt washers

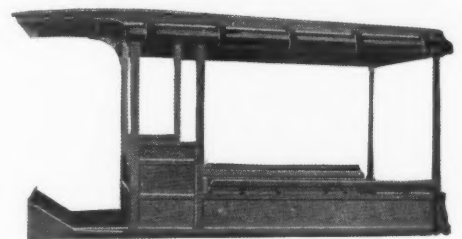
Drabek Equalizer Attached to Ford Frame



are heat treated forgings, while the hubs are malleable, balls $1\frac{1}{8}$ in., bearings cup and cone type and the spokes $1\frac{1}{4}$ in. The steering angle may be directed to 35 deg. on the right and 32 deg. on the left.

R. AND H. COMMERCIAL BODIES

The R. & H. Sheet Metal Co., 109 Center Avenue, Abington, Mass., is manufacturing the R. and H. Commercial Bodies for Ford cars. The bodies are constructed of ash and oak and are finished in natural wood or maroon, but special colors are optional on special orders. The material is seasoned and properly jointed, glued and ironed, thus insuring substantial construction. Lighter wood is used in the roof where light weight is essential. The floor is of hardwood, running lengthwise, screwed with wear plates. The roof covering is of good quality and is guaranteed weatherproof. Curtains are of oil duck and when down are secured in place by the Murphy fasteners. The seat



R. and H. Commercial Body

Showing the R. and H. No. 10 body with curtains up

is upholstered with springs set in box frame and is padded with curled hair and covered with substantial artificial leather. A tool compartment is underneath the seat. The inside loading space measures 53 in. long by 44 in. wide by 54 in. high. Wing sides and chain tail-gate are furnished. These specifications apply to Model No. 10, which sells for \$80. Models Nos. 15 and 20 are of the enclosed type and both sell for \$95.

PARKER RUST-PROOF Co. of America, Detroit, at a recent meeting of stockholders re-elected Clark W. Parker, president, and Wyman C. Parker, secretary-treasurer and general manager. The other officers elected were J. G. Johnston, vice president; E. C. Hoelzle, assistant treasurer; U. M. Cornelius, assistant secretary, and L. Hulbert, comptroller.



TRAILER DEPARTMENT



The Auto Before the Cart

By CHESTER S. RICKER, M. E.

IN Peru, Indiana, there is a company that employs a trailer to great advantage in a business way. This is the Sanitary Milk & Ice Cream Co. The company sells ice cream and buys milk and cream. The method of gathering this cream is unique and a great time saver. Before the addition of the trailer to the firm's assets it was necessary to cover the territory twice a week and, as the route was fifty miles long, the best that a team of horses could do was to make the circuit in two days. This service was required twice a week and it was found that few drivers would contract to cover it and the lowest price paid for this service was about thirty-five dollars per week.

These merchants thought that they were doing the very best until they purchased a Ford roadster and put a small truck bed on it. This addition to the car permitted the carrying of sixteen 5-gallon cream cans weighing 50 lbs. each. It proved a great

saving, for the driver could make the fifty mile circuit in one afternoon instead of two days. But the Ford lacked capacity, as the former loads had been with forty cans. Even with the more frequent trips the new machine effected a decided saving. Then these enterprising merchants heard of the trailer. It would only cost them a little over one hundred dollars. Would it justify the cost? They were willing to try. This trailer now carries twenty-four cans, which together with the sixteen on the Ford, make up the quota that was originally carried by the team. But now the entire route of fifty miles is covered in an afternoon and the full amount of cream collected, one whole day being consumed, or two afternoons, in covering the territory over which it formerly required four days. These merchants seem to think that it has paid big dividends.

Down in the southern part of Indiana there is a grocer in one of the larger cities

who takes every forenoon to drive over about fifty miles of territory. He has quite a trade among the farmers and in turn buys much from them. His business, while profitable, has never grown to any size commensurate with its merit because his car could not carry more than a definite amount. But the addition of a trailer has not only doubled the trade with the country side, but has permitted him to return with fresh produce which was quickly taken by his city trade at top prices.

Trailer Carries Passengers

Perhaps one of the most unique applications of a trailer is for carrying passengers. One keen individual, in a city where the jitney was popular, put a top and seats for ten in the trailer. Thus he made his Ford accommodate four and the trailer ten or fourteen fares were obtained where only "four had grown before." Several hotels have solved their station 'bus service



The Old and the New Meet Again

Interesting and helpful information; reputable advertisements—that's the CCJ

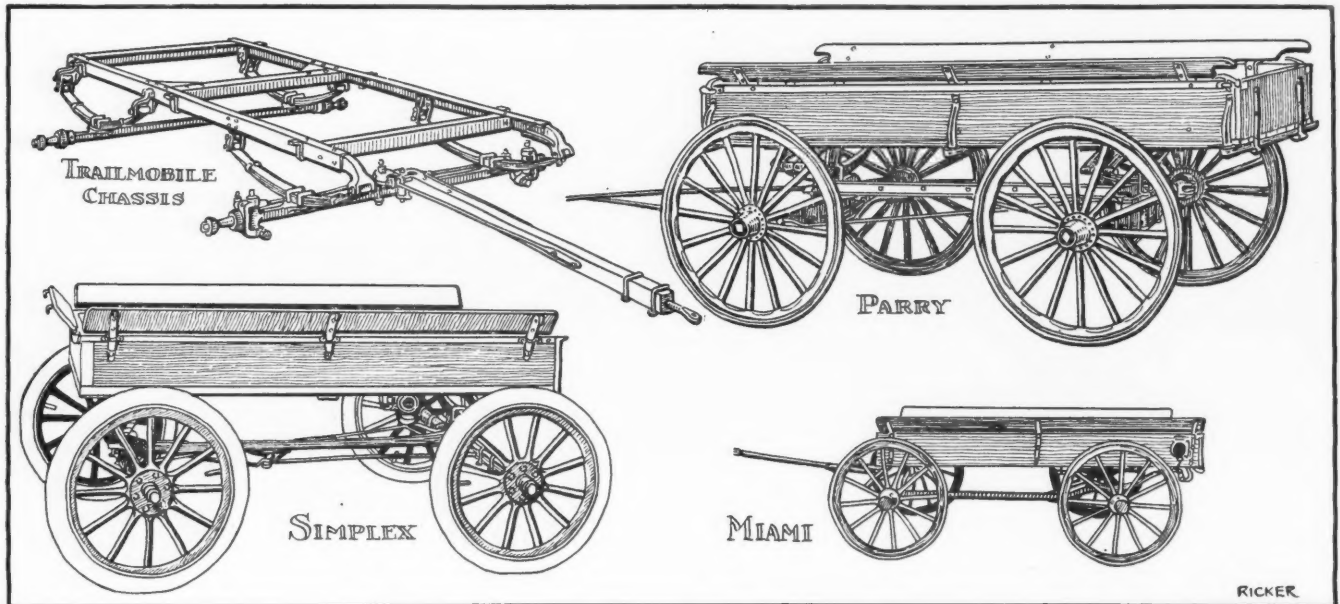
by the purchase of a Ford and a trailer with seats and canopy top. Between trains the Ford could be put to much other useful work, while the seats could be removed from the trailer and it could be used to haul supplies or trunks, thus saving expenses or providing additional revenue for the hotel.

In Cincinnati the big Lodge & Shipley Machine Tool Co. use two Jeffery trucks of three-quarter ton capacity. Their hauling

an extra drag on the truck to which it was attached, was more desirable than a new truck with its very much greater expense. Despite the severe conditions of operation, they tried out a $\frac{3}{4}$ ton Trailmobile on one of their trucks. Thus they increased the capacity of their truck one hundred per cent. and at a cost which was only about twelve per cent. of that which they would have paid for a new truck. Was the service satisfactory, you ask? They have al-

up like a pigeon hole letter box with a body in each compartment. They are usually double decked so that the length of the trailer will not be too great yet the capacity retained. Two and four wheel types are used. They are hauled by both finished and test cars, the former being a service car which probably has many other duties to perform besides that of pulling the body trailer once or twice a day.

One country oil salesman has gone so



Some Prevailing Types of Trailers

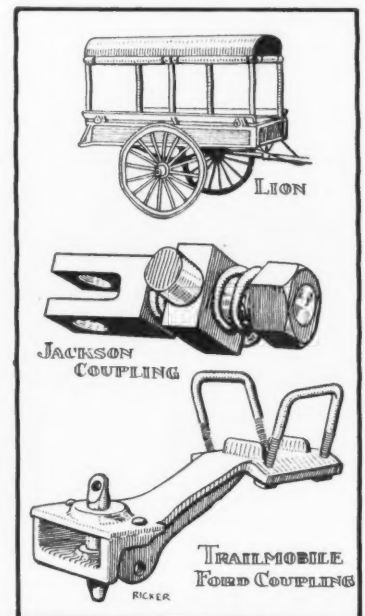
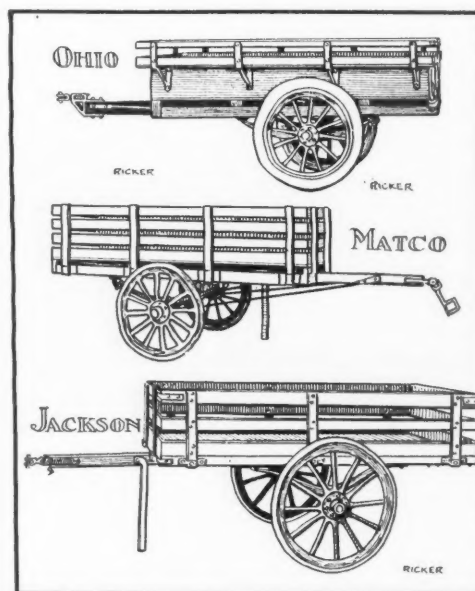
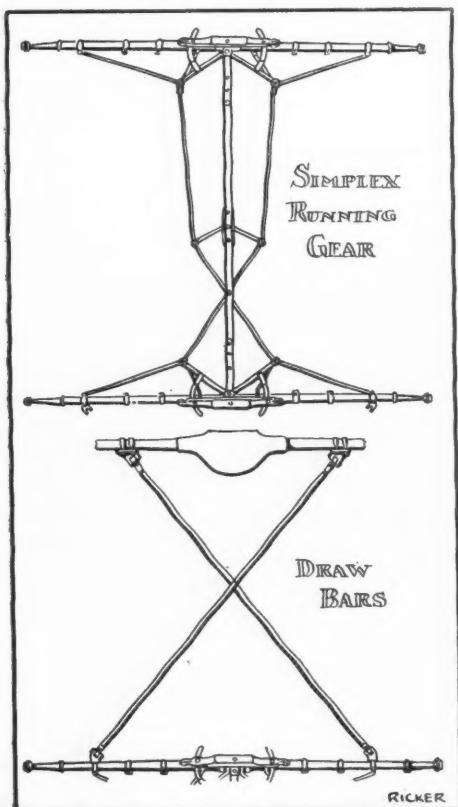
demands became so strong that it became a choice of another truck or a trailer. Cincinnati is very hilly and it was questionable whether a trailer without any motive power,

ready purchased a second trailer instead of a new truck. That should be self evident.

No one who has either lived or passed any length of time in Detroit can say that they do not know what a trailer is. One of the most familiar sights in the city is the big elephant-like trailers that carry from six to ten automobile bodies. These may be only in the rough metal or they may be completely finished ready to apply to the chassis. They are interesting affairs, made

far as to mount a tank on a trailer and thus carry kerosene around to the farmers in his territory. He can cover the ground so much faster in this way that it has easily paid for the additional outlay.

One use of the trailer which has never gained popularity in this country is luggage carrying. On account of the good roads in England there has been developed a single wheel trailer which can be attached to the rear end of the touring car, very much like a large trunk carrier with a single wheel



Running Gears and Coupling Devices on Some Well-Known Trailers

The CHILTON ideal—honest circulation; results to advertisers—fully exemplified in the CCJ

at the center of the rear end to support it. Such a device over good roads only has the question of appearance against it. The single wheel trailer would be impracticable in this country as too many of our roads do not have a center track. Over there the roads are like billiard tables and without ruts so these trailers work well.

Regarding Trailer Insurance

When purchasing a trailer one should take the insurance into consideration carefully. It is subject to just about the same risks that a car is. On the other hand, you should not overlook the fact that the trailer may make your present policy on the automobile void. Most insurance companies will make no additional charge for the use of a trailer when writing fire and accident insurance. But when it comes to liability insurance the trailer is generally considered as increasing the risk. One had better take up the matter with the insurance company before doing much running with the trailer attached.

You ask, "Can my roadster or touring car pull a trailer?" It certainly can do so and without any change can easily handle a load of a ton. The Ohio Trailer Co. gives some information in regard to the towing power of an automobile, draw-bar pull as it is called. "The draw-bar pull of an automobile is that in addition to carrying its rated load it has the ability to pull it along. Do not confuse draw-bar pull with carrying capacity, therefore. Tests have proven that to pull a ton of material, on a properly constructed trailer, requires a draw-bar pull of 50 lbs. on a level paved street and 150 lbs. on a level country road. Taking grades, bad roads and traffic conditions into consideration it was found that an average draw-bar pull of 250 lbs. was required to haul a ton of material. Tests have also proven that an automobile has a draw-bar pull of one-half its carrying capacity, in addition to carrying its rated load. The average roadster or touring car has a carrying capacity of 1000 lbs., therefore it has a draw-bar pull of 500 lbs., by which it is capable of pulling 4000 lbs., in addition to carrying its 1000 lb. normal load."

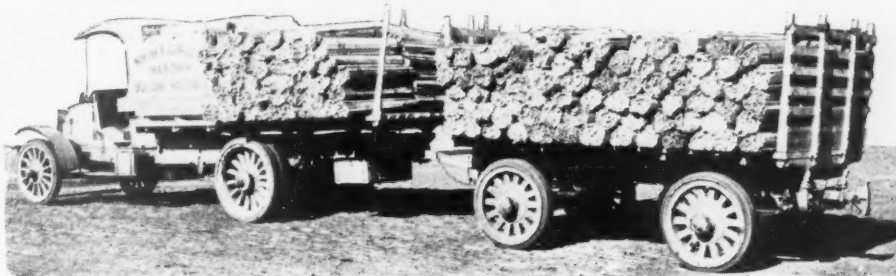
Any one of the trailers illustrated in the accompanying article except the big 5-ton Troy can be drawn by a car as small as the Ford roadster and with still greater ease by larger machines. It would seem that for the manufacturer the combination of the $\frac{1}{2}$ or $\frac{3}{4}$ ton truck with one of these trailers should be an ideal combination for economy and convenience.

Two and Four-Wheel Type Trailers

It will be noted that all of the trailers used in this country fall into one of two classes: two or four wheel types. The former are the lightest weight and have the least carrying capacity. They handle better than the four wheel vehicle unless the latter has some special steering device. This is due to their being shorter than the other type. The largest of the two wheel type has a capacity of three-quarters of a ton, although the most of them are built for a half-ton or less. When greater weight is to be carried the four wheel truck is necessary. The Simplex Trailer

is listed in 1, $2\frac{1}{2}$ and 5 ton capacities, although this is getting beyond the real scope of the trailer for attachment to pleasure cars. The half and three-quarter ton capacities are about the limit because they can be attached to a car which will travel at 18 or 20 m.p.h. with this load. At that speed the engine can be kept cool and in fact will not show any indication of the extra load. The gasoline consumption will also bear this out. Take the first example mentioned in this article. The gasoline consumed when carrying a ton load of cream, or the forty cans, was only $3\frac{1}{2}$ gallons for an afternoon run of 50 miles. Further a load of this weight will not rack the trailer and strain the car that is pulling it even if

tendency to cut off the curb corners. This is a thing which every driver who hauls a trailer will have to carefully observe when turning corners. Another thing which every coupling should have is a good cushion spring between the car and the pole. If this is not provided the stopping and starting strains will severely tax the rear cross member of the frame. Drivers should also observe more care in starting and stopping when drawing a large dead load like a trailer. It has no brakes, so it will increase the load on the car's brakes. If the car weighs 1600 lbs. and the tractor 600 lbs. or 1600 lbs. with a half-ton load it will mean that your brakes will have the duty of stopping another car of equal



Five-Ton Trailer Drawn by Five-Ton Truck
Doubling truck's efficiency with only small extra expense

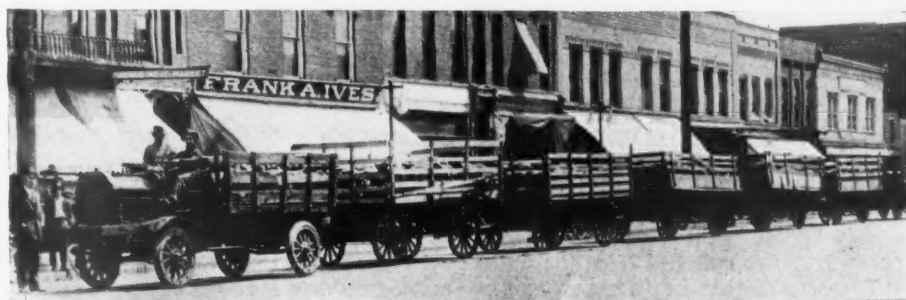
20 m.p.h. is maintained. One truck loaded was driven from Indianapolis to Cincinnati, 115 miles, in 6 hours and 27 minutes, or at an average speed of $17\frac{3}{4}$ m.p.h.

There are a number of very important points to note in connection with an automobile trailer. They should be fastened securely by a fully universalizing joint, otherwise they will be liable to twist the frame. These couplings should be designed securely, but permit disconnection in a few seconds. The two wheel trailers should have a heavy and well braced pole, because it has to carry a good part of the trailer load if the latter is not uniformly placed. On two wheelers the load should be equally distributed, half in front and half behind the axle, otherwise the car will have to carry part of the load. The four wheelers only require a draw bar, as they carry the entire load on the wheels and none is transmitted through the bar to the back end of the car. The four wheelers must be provided with some special steering device, otherwise the trailer will develop a great

weight and that with the same effort expended you will take twice as long to stop. In starting the same thing is true. You will have to get a 3200 lb. car under way instead of a 1600 lb. one and naturally it will take twice as long to get up to speed with the same throttle opening.

The great advantage of the trailer for most users is the possibility of making a truck out of a touring car or runabout without spoiling the finish of the car and the ability to have it available for pleasure in a moment. For the manufacturer it permits twice the carrying capacity to be obtained from a truck with only about 10 or 15 per cent. more investment. The trailer has well deserved the characterization that it was the "Younger brother to the automobile truck."

THE GOODRICH Co., Akron, O., has just issued Vol. 5 of "Motor Truck in America." This book sets forth the exact specifications of the different trucks, with the design, material, equipment, price, etc.



The Trackless Locomotive of the Future

There could hardly be a better illustration of how the properly equipped motor truck is aiding in solving country transportation problems that have heretofore made farming in many communities unprofitable, than the accompanying photograph. It shows a Duplex truck, equipped with Firestone single-tread solid tires, hauling a train of six heavy wagons, loaded with 300 sheep, into Charlotte, Mich., after traveling ten miles over rough country roads. The total weight of the train was more than 20 tons. The sheep weighed 15 tons and the wagons, not including the truck, 9000 pounds.

Everybody who is anybody in the truck industry reads the CCJ

CHILTON TRACTOR JOURNAL

Removing Snow With Tractors*

How the Chicago Park Officials Remove and Dispose of Snow

By H. S. RICHARDS†

ONE of the most exacting duties of a park official is that of maintaining walks and drives in good condition for travel even during or shortly after severe snowstorms. In a park and boulevard system like that of the South Parks in Chicago, which has boulevards leading through the crowded downtown business districts where the traffic at certain hours is exceedingly dense as well as through the residence districts in which travel is rapidly increasing year by year, problems are met that are sometimes quite difficult of solution. In this paper I will deal with those concerning snow removal and disposal as they are handled by the South Park Commissioners, Chicago.

The operations connected with this line of work may be outlined as follows:

1. The necessity for an immediate opening of paths through the snow on the walks and drives, and this for several reasons:

- (a) To facilitate traffic.
- (b) To prevent packing the snow which would result in an increased cost of removal.
- (c) To protect the pavements from the wear occasioned by traffic, which usually follows the ruts worn in packed snow.
- (d) To prevent the possible formation of a dangerous icy coating by alternate thawing and freezing.

2. The actual removal or disposal, as soon as possible after paths have been opened, of all snow from walks and drives in the busy downtown sections by hauling to the dump or otherwise.

As to the methods of handling the snow-cleaning problem, the first means used for cleaning the walks and opening paths on the drives was that of horse-drawn plows. On all the walks, except those in front of business houses in the downtown district, where the snow is cleaned from the walks and deposited in the streets, both 1 and 2-horse plows are used—the V-shaped plow

for one horse and small road graders for teams. These types have answered the purpose fairly well as they are easily handled.

Snow removed from the drives has proved more difficult as some traffic is constantly passing along packing the snow even while it is falling. The type of horse-drawn plow that has given the most satisfactory service has been the 4-wheeled adjustable-blade road grader. Hitches of from 2 to 4 horses, depending on the depth of snow fall and its character as to whether it was dry and light or wet and heavy have been used on a machine. On most of the boulevards and in the larger parks these plows are used in groups of 4 to 6, all traveling in the same direction and lined up diagonally so as to clean the entire drive in one round trip. The first plow throws the snow from the center of the drive toward the gutter, each succeeding plow cleaning its swath and throwing the ridge of snow closer to the gutter until the last plow has piled it up along the curb. In going in one direction one-half of the driveway is cleaned and on the return trip the other half. Some of the boulevards have two drives, one on each side of a central strip of lawn. On these the snow is all cleaned towards the central parkway so as not to pile it up in front of the homes on either side of the boulevard.

In the South Park system there are at present 45 miles of drive from which snow is cleaned in winter. To cover these drives with horse-drawn plows in a reasonable time would require a larger equipment of horses and plows than now on hand—in fact, several times as large—as the horses cannot travel faster than a walk through the snow and, although heavy draft horses have always been used, the work with a moderate snowfall is quite wearing on them. While horse-drawn plows are covering their routes some snow is being densely compacted by the constantly passing traffic, with the result that these plows remove little more than the loose snow, being practically unable to rip the packed snow off the pavements to which it adheres very firmly. Ruts are formed in the packed snow, and traffic following these ruts wears down through the snow to the pavement. As automobile tires in winter are usually equipped with chains, the resulting wear of

such traffic on the narrow strips of pavement at the bottoms of the ruts damages the pavement considerably, necessitating costly repairs in spring.

As soon as motor trucks became practical vehicles we tried various snow plow attachments on them, but have never found one that will clean the snow as desired. Quite a little time and money were spent in fitting up a 5-ton motor truck for snow cleaning work, but it did not give satisfactory service. One of the chief difficulties for a long time was the lack of traction when moving ridges of snow from the centers to the sides of the drives, even after a moderate fall of snow. As soon as the ridges acquired any depth to speak of the motor plows became helpless through lack of traction, not that the engines were not powerful enough, but because the machines become "stalled" and slide sideways with the rear wheels revolving on the pavement.

In the winter of 1914-15 a new type of snow-cleaning machine came to my notice. This outfit consisted of a 3-wheeled gasoline tractor fitted in front with a V-shaped plow or mold-board that was removable, and a large revolving street broom mounted on wheels to be attached behind the tractor. The construction of the outfit was quite heavy so as to withstand the strain of plowing through banks of heavy wet snow. The plow blade has considerable curve, which causes it to travel quite close to the pavement when plowing, and on one side of the plow there is an adjustable extension or wing that can be set at any angle as conditions require.

Demonstrations were given that showed the ability of the outfit to operate satisfactorily under the different conditions of snowfall usually met with, and the result was that the Park Commissioners ordered three of the outfits for service in the winter of 1915-1916. As the need for snow cleaning is felt most in the congested downtown district, which is also the most difficult district to clean, the three tractor plows were assigned principally to that district. After various preliminary trials it was learned that the broom attachments were the best for cleaning walks and for very light snow on the drives, while for the heavier snows the tractors gave better service with the

* From a paper before the American Society of Municipal Improvements.

† Superintendent of Maintenance and Repair, South Park Commissioners, Chicago, Ill.

plow attachments. It was finally decided that the best plan for this district was to fight the snow while it was falling and not permit it to accumulate at all or give it any chance to become compacted by traffic.

So it was arranged that two of the tractors with brooms and the third with a plow as well as a revolving broom, should be put into operation shortly after snowfall began and continue operating as long as snow was falling. The third tractor was equipped with a plow in addition to a broom because it had to move the ridge of snow swept aside by the two tractors immediately preceding it. The snow was cleaned from the center to the side of the drive, the machines traveling with the traffic at a rate up to 10 m.p.h., so that they made a round trip over a particularly busy stretch of downtown boulevards a little over a mile in length every 15 or 20 minutes. The snow is continually being brushed toward the sides of the drive ready for hauling to the dump, so that practically as soon as the snowfall ceases the machines are through with this stretch of downtown driveway, and it is in good condition.

When the machines finish work on the above mentioned drive the revolving brooms are removed, the tractors hook on the plow attachments and are then sent out to assist the horse-drawn plows in cleaning the balance of the park and boulevard drives, the tractors being given the preference for the busy boulevards as their rate of travel is much greater than that of the horse plows, making them less inconvenient to the traveling public. By changing shifts of drivers the tractors can be operated 24 hours per day; this makes them of special value for work during the night, when we do not have horse-drawn plows in operation and when the traffic is not so heavy as in the daytime. Although the road graders could also be operated all day and all night with changes of horses and drivers, that plan is not so practical on account of our inability to secure additional teams and drivers after storms, which is the time we need them most, and the additional cost would be considerable.

These outfits have been tried out on light dry snow, heavy wet snow, sleety or icy snow and snow packed by traffic, and under these different conditions they have given first-rate service. At their rate of speed of 9 to 10 m.p.h., with sweeper attachments, they are able to secure good results with revolving brooms in places where horse-drawn sweepers will not operate properly. The speed of the latter is not sufficient to revolve the brooms fast enough to prevent the bristles becoming clogged with snow, in which condition they will not sweep the snow aside. This trouble is not experienced with the tractor brooms, as they revolve too rapidly to become clogged, and consequently clean the walk or drive pretty thoroughly. With our three tractor outfits we have been able to keep a section of downtown drive 1.12 mile long practically clean and open for traffic during a snow falling at a rate not exceeding 1 in. per hour. It is our intention to add to our motor snow cleaning equipment year by year so as gradually to replace the horse-drawn plows. Carefully kept records show that we have been able to do snow cleaning with tractors at a cost

considerably less than with horse-drawn machines. The tractor outfits are particularly valuable in breaking up packed snow and ice, and in plowing on the drives they can throw the snow in ridges several feet deep on top of the curb, leaving the gutters entirely free and open, which is most desirable. Horse-drawn machines are able to plow only a part of the snow up over the curb, leaving most of it in the gutters.

No matter how well a working force may be organized it seems that at times, as in emergencies for instance, previously made plans will not work out to perfection. Sometimes we get caught by sleet storms that cover the drives with frozen slush and ice, leaving them in a bad and dangerous condition. After one such storm last winter considerable slush was frozen on one section of driveway that we had been unable to finish cleaning before it froze. The next day the ice was picked loose and hauled to the dump. When using laborers it was found that it required 4 men with picks to loosen enough to keep a team busy hauling it away. We soon learned that a tractor pulling a road grade worked very well on the frozen slush and ice and with this combination enough was loosened in 1 hour to keep 7 teams busy 4 hours.

In addition to plowing or sweeping, the tractors, with plow and broom attachments removed, have been repeatedly used to advantage in hauling wagons loaded with snow from the downtown district to the dump. For one of the tractors an especially large wagon, holding 14 cu. yds. water measure, was built, and the tractor had no trouble handling it. A special device fitted to this wagon enabled the tractor to dump out the 14 yards of snow in a few seconds.

I have for some time thought of disposing of the snow on the downtown boulevards through the sewers, so as to eliminate the expense of taking it to the dump, so last winter, a device consisting of a water turbine, armed with 3 free blades, and mounted in a wire cage or basket of a

size to allow it to be set in a sewer man-hole, was made and tried out. The water turbine was connected with a fire hydrant, the stream of water revolving the turbine and then flowing through the wire basket into the sewer. The free blades on the turbine agitated snow shoveled into the basket and mixed it with the water, which carried it on through the sewer. With a pressure of 15 to 25 lbs. the machine disposed of all the snow that two men could shovel into the wire basket, and with a higher pressure it should take care of all that four men can shovel into it.

Granulated rock salt sprinkled over the drives has also been used for removing snow. There have been some complaints, however, against its use on the park and boulevard drives, the chief objections being that it melts the snow and forms puddles of water that are splashed upon automobile bodies forming white spots when dry due to the salt dissolved in the water; also, that it is tracked into stores and houses, soiling floors and carpets. For this reason we have had to use it sparingly, and then usually to "rot" or weaken the icy coatings formed after sleet storms or on densely compacted snow and ice, so that snow plows or graders could rip such coatings loose from the pavements. Immediately after the sleet storms walks and drives are made safe for travel, until the snow-cleaning machinery can remove the ice by spreading torpedo sand lightly over them from specially designed wagons and carts.

The problems connected with snow removal and disposal are becoming more and more important every year and merit considerable attention, but it will undoubtedly be some years before machinery and methods are perfected that will enable us to meet all the requirements in a practical, efficient and economical manner. Until then every contribution toward the solution of these problems will be heartily welcomed by those who realize the importance of snow cleaning work in our large cities.

NOVEL RIG USED BY LUMBER MILLS

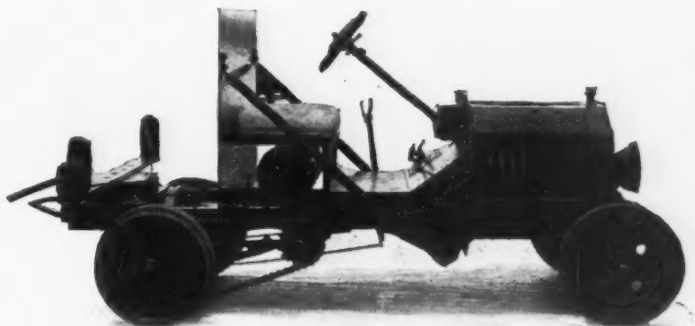
A tractor made from a combination of a Ford car and the Western truck attachment, is being used in some of the largest lumber mills in the Northwest to haul two wheeled trailers or "dollies," as they are called in the lumber industry.

As the horizontal cross spring on the rear of the Ford is not heavy enough for bulky loads of lumber it has been removed,

and two full semi-elliptic springs, 42 in. long and 2 1/4 in. wide, are put on longitudinally. These springs consist of ten oil tempered leaves or plates, 9-32 of an in. thick.

The rear wheels of the Western truck attachment have a 4 in. face and are 22 in. in diameter. The attachment proper has a 40 in. tread and a 100 in. wheelbase and often replaces five horses in the work of hauling timber through the different lumber yards in Everett and other milling towns in the Pacific Northwest.

Tractor Outfit Used by Northwest Lumbering Trade



THREE-WHEELED BUDA ELECTRIC INDUSTRIAL TRUCK

The Buda Co., of Chicago, announces a new electric industrial tractor known as the type TW, three-wheeled tractor. Some of the features of this new model are the simplicity of operation, the worm drive with full floating rear axle, and accessibility of the various parts. Either an Edison or Iron-clad Exide battery can be had in this tractor.

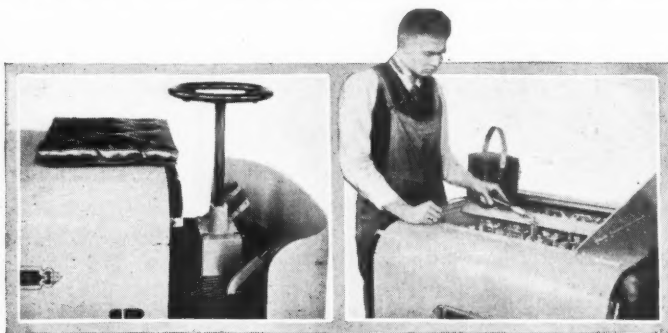
The simplicity of operation enables the tractor to be easily handled in close quar-



The Buda Type TW Industrial Tractor

Has 33 in. tread, 37 $\frac{7}{8}$ in. wheelbase, and 65 $\frac{1}{2}$ in. overall length. Simplicity, accessibility and sturdy construction feature this new model.

ters. The operator has both hands free for steering. Pressure on the right pedal releases the brake, the middle pedal controls the forward speeds, and the left pedal controls the reverse speeds, there being three speeds in either direction. The overall length is 65 $\frac{1}{2}$ in., and the wheelbase is



37 $\frac{7}{8}$ in. The top of the deck is 21 $\frac{1}{8}$ in. high. The machine has a 33-in. tread.

Mechanical Features

Timken-David Brown worm and worm gear are used in conjunction with a full floating rear axle, these gears being encased in a dust-proof housing and running continuously in lubricant. The worm is mounted on S. K. F. self-aligning ball bearings, thrust being taken by ball bearings, with wheels carried on Timken tapered roller bearings.

The differential is mounted on annular ball bearings on each end with ball thrust bearings to take the lateral thrust. Reducing gears and pinions are mounted on S. K. F. self-aligning ball bearings.

The motor is series wound and directly connected through a self-aligning coupling to the worm gearing, making a simple and direct drive. The armature rotates on S.

K. F. self-aligning ball bearings. The motor is readily accessible. The controller is a Cutler-Hammer standard reversible drum type. The three speeds either forward or reverse produce from 1 to 7 m.p.h. vehicle speed.

The frame used is a 4 in. section rolled steel channel, 7 $\frac{1}{2}$ lbs. to the foot. It is reinforced with cast steel cross braces. The brake drum, 7 x 3 $\frac{1}{2}$ in., is mounted on the driving shaft in front of the motor. The brake bands contract and are lined with thermoid.

Battery Accessibility

A steel door on top of the battery box is readily adjusted and exposes the batteries for testing purposes. The sides of the box, as well, can be raised to remove the battery. Within the battery box is the fuse block, controller and charging receptacle.

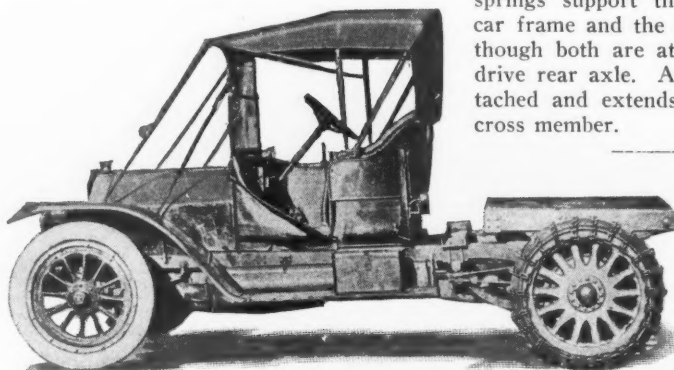
The rear wheels are 20 in. in diameter, the front steering wheel being 16 in. Solid tires are used, the rear being 20 x 3 $\frac{1}{2}$ x 2 in., and the front 16 x 3 $\frac{1}{2}$ x 2 in., pressed-on type. All wheels are carried on Timken tapered roller bearings.

THE FIRST MOTOR TRUCK EVER SEEN IN CEIBA, if not on the entire north coast of Honduras, recently arrived from New Orleans and, immediately upon clearing the customs, was taken to the plant of its importer, who is an ice manufacturer. As makers of automobiles have been actively trying for some time to introduce motor-delivery cars on this market, the arrival of this truck is something of an event.

Control and Accessibility

The operator's seat is on top of the battery box, as shown at the left. The operator's hands are free for steering only, the pedals operating forward and reverse speeds as well as the brake. At the right is illustrated the battery accessibility.

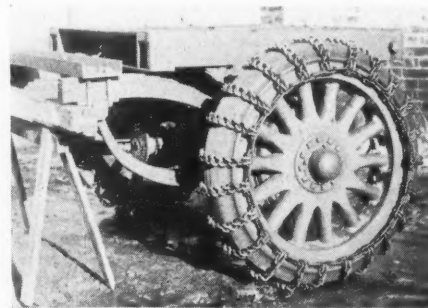
While the import duty on gasoline makes that fuel very expensive there, it is quite likely that more motor vehicles will be purchased after this one has demonstrated its usefulness.



Knox Two to Three-Ton Tractor Unit Attached

KNOX UNIT FOR CONVERTING PLEASURE CARS INTO TRACTOR TRUCKS

The Knox Motors Association, of Springfield, Mass., has announced the production of a unit for converting a pleasure car into a tractor-truck, the price being \$550 f.o.b. Springfield. The capacity of the outfit complete is from 2 to 3 tons. The unit is composed of an internal gear drive rear axle,



Knox Truck-Tractor Unit

Both sets of springs, torque arm, cross-member, etc., are clearly shown herewith

the trailer platform and necessary connections, and it takes the place of the rear axle and tonneau of the touring car. Tires supplied will be 36 x 6 in. solid rubber, Goodrich being regular equipment. Other specifications are wooden wheels, with S. A. E. rims; internal gear drive axle, torque arms, heavy springs; bolts, spring brackets, clips and 8 in. transverse channel to enable the attachment to be applied to varying frame widths. Almost any touring car can be converted within a few hours into a useful vehicle for commercial purposes. Under this system none of the load comes on the touring car frame and the machinery is cushioned both as road and starting shocks on springs.

Heavy wagon springs are mounted on the internal gear drive axle, these springs supporting the platform which in turn supports the front end of the trailer. As shown in one of the illustrations, heavy quarter-elliptic springs are attached to the cross-member, this channel-section transverse piece being in turn attached to the pleasure car frame. These quarter-elliptic springs, it will be seen, support a portion of the touring car weight, and none of the trailer load, as they are connected to the rear axle direct. The heavy wagon springs supporting the platform carry the load of the front of the trailer. Thus it will be seen separate springs support the rear of the touring car frame and the front of the trailer, although both are attached to internal gear drive rear axle. A torque arm is also attached and extends from the axle to the cross member.

The Ultimate Type of Tractor Engine*

By H. L. HORNING†

THE old type of tractor was built with the belief that high traction ability depended entirely on weight, a mistaken idea based on the supposition that road friction was the governing factor in a tractor's ability. This led to design of tractors whose weight was much greater than that of any other moving vehicle. Enormous engines were required to propel these tractors, and many of them labored under the handicap of having only 20 per cent. of the horsepower developed available for traction in average soil, owing to the high tractive resistance and inefficient transmission mechanism.

As the development goes on, the usefulness of the tractor becomes broader. The number of farmers who can afford them is increasing, because of the decreased price; the reliability is becoming greater and the possible applications more numerous. The usefulness of tractors increases as:

- 1—Weight of tractor per horsepower developed decreases.
- 2—Weight of engine per horsepower decreases.
- 3—Transmission losses decrease.
- 4—Tractive ability of drive-wheel becomes greater.
- 5—The longitudinal center of gravity of tractor and the draw-bar hitch are more effectively placed.
- 6—Output of useful work in unit time divided by the initial cost increases.
- 7—Total cost per unit of work done decreases.
- 8—Price of tractor approaches the average income of farms that are suitable for tractor application.
- 9—Range of conditions under which the tractor can operate successfully broadens.
- 10—The tractor can do a number of things well on the farm.
- 11—Knowledge of the care and operation of its component parts becomes prevalent among farm users.
- 12—As the following questions regarding the tractor can be answered to the satisfaction of the farmer:
 - (a) How many plows can it handle?
 - (b) How much does it cost?
 - (c) Will it burn kerosene?
 - (d) What else can it do besides plowing?
 - (e) How long can it last?
 - (f) Is the engine the same type as in his car?
 - (g) Can he get repairs promptly?

Engine Specifications

We will have defined a type of engine if we can establish general specifications that will make for tractor usefulness in the following respects: (a) range of horsepower for the tractors that can be used on the average farm; (b) most logical cycle for such service; (c) number of cylinders; (d) mean effective pressure required; (e) fuel range; and (f) governor control.

Horsepower Required.—Tractors satisfactory for plowing must pull not less than

two plows on the average soil. At least 90 per cent. of all farms can be worked with two- to four-plow tractors, taking 10 h.p. minimum and 20 h.p. maximum at the drawbar. We are chiefly interested in the ultimate engine for the 90 per cent. and can therefore figure on engines of between 16 and 40 h.p. In establishing these limits we must consider the increased tractor efficiency to be expected in the future and also the low efficiency in some larger types of tractors.

Available Cycles.—The brake horsepower desired from an engine has a profound influence on the cycle, since the area and design of the combustion chamber determine the power produced from any cycle.

Undoubtedly the future holds much in store for the development of engines operating on the Diesel and semi-Diesel cycle, but it is doubtful if their weight can ever be decreased to such an extent that their greater efficiency will overcome the disadvantages of the decreased traction efficiency due to their great weight. When there is a real shortage of the lighter fuels it may be necessary to use an engine that will burn the heaviest oils.

The two-stroke cycle engine with its simplicity seems ideal, but up to this time attempts to make a reliable and economical engine have failed. The complications resulting are far worse than those that the cycle attempts to correct.

Other new cycles are being proposed from time to time, but every demand of successful tractor operation seems to be fulfilled by the four-stroke cycle engine. The horsepower per cu. in. displacement or the weight per horsepower cannot be improved by any other cycle, all other things taken into consideration. We must therefore consider that the four-cycle engine is and will be the most suitable for tractor service and will be the ultimate type.

Number of Cylinders.—There is a tendency toward the four-cylinder engine. The satisfaction it is giving in sizes between 16 and 40 h.p. in automobile and tractor service is the influence that is making four cylinders the standard. Several successful tractors are equipped with two-cylinder horizontal-opposed engines; these have worked very well, considering the difficulties inherent in their design. These can be summarized as follows:

1—The tendency for the shaft to revolve longitudinally in the plane of the crankshaft due to centrifugal, inertia and gas forces. This tendency loosens the main bearings by throwing the shaft out of line. The crankpin bearings ride alternately on one side of the pin and then the other, causing damage and necessitating frequent adjustments and replacements.

2—Great weight of reciprocating parts compared with the brake horsepower, augmenting the difficulties enumerated under (1).

3—The high centrifugal forces as compared with the brake horsepower, resulting in effects as listed under (1).

4—Difficulty in cooling the large piston and valve heads necessary in obtaining 20 h.p. per cylinder.

5—Difficulty of maintaining a perfect mixture in the long intake header as well as the impossibility of attaining high volumetric efficiency with the high velocity necessary for maintenance of mixture quality.

6—Difficulty in lubricating all parts sufficiently without over-lubricating the cylinder.

7—The disadvantageous location of the valves.

8—Infrequency of impulse, the lack of balance and its influence on the transmission mechanism.

Pressures and Operating Speeds

The history of internal-combustion engines of all types and number of cylinders is a succession of efforts to increase both the working speed and mean effective pressure.

From past experience it is obvious that small bore engines are much better power producers because they are much favored in both the matter of speed and mean effective pressure. Inasmuch as four-cylinder engines capable of producing a maximum of 40 h.p. can be equipped with small cylinders, it seems reasonable to feel that such an engine will be particularly well adapted for tractor service.

Combustion-Chamber Area.—There is an important, though as yet undetermined, relation between the combustion-chamber wall area and its volume; this relation is a governing factor in determining the compression at which an engine can run satisfactorily. Compression and volumetric efficiency determine the mean effective pressure and influence economy favorably. The larger ratio of wall surface to volume in small bore engines makes the problem of cooling easy in the four-cylinder type. Piston heads of diameters up to 5 in. are not difficult to cool. Valves up to 2½ in. clear diameter can be cooled satisfactorily, and inasmuch as 20 h.p. can be developed per inch of valve diameter at the engine's most satisfactory speed, we have another evidence of the advantage of the four-cylinder engine for tractor service.

Performance Records.—Inertia forces, which vary roughly as the cube of the bore, have been found to be the principal cause of crankpin-bearing destruction. Our experience with thousands of tractor engines strongly corroborates this statement. In fact we design engines understanding that they will operate, not at the speed set by the governor, but at a slower speed of higher torque caused by the load being always greater than the engine can handle at governed speed. With the cooling properly taken care of our experience is that the length of the period between adjustments is a function of lubrication efficiency and the total number of revolutions. Having built an engine that will cool properly our test is to see how many million revolutions the engine can run between major adjustments. All things considered no other en-

* From a paper before the Society of Automobile Engineers, January 11, 1917.

† General manager, Waukesha Motor Co.

gine of ours has yet equaled the performance of a four-cylinder engine, which in service has run 420,000,000 revolutions with four adjustments of the connecting-rods and three adjustments of main bearings, finishing in good shape with the original valves, pistons, rings, bearings and crankshaft. This no doubt has been duplicated by other four-cylinder engines.

For the purpose of discussing four-cylinder, four-stroke cycle vertical engines from the standpoint of fuels, other than high grade gasoline, it is necessary to revert to the question of combustion-chamber walls. Because of the readiness and lower temperature at which the lower grades of fuel crack into higher and lower hydrocarbons the necessity for better control of maximum cylinder-wall temperatures points toward a range of bore and wall-area ratio to volumes that will give the best results through the automatic thermostatic effect of mere combustion-chamber dimensions.

Four-cylinder engines of either L-head or valve-in-head types fulfill these conditions between the cylinder bore sizes of $3\frac{1}{2}$ to 5 in., which correspond to the range of 16 to 40 h.p. sizes demanded for tractor service. Above 5 in. bore engines tend to become "hot," and the cylinder wall is favorable for vaporization due to conducted and radiated heat given off at the slower speeds; below $3\frac{1}{2}$ in. bore wall temperatures are too low, but great turbulence due to higher speed of the smaller engine helps to overcome the lower wall-temperature effects. The cylinder walls for burning kerosene should be as hot as possible without danger of a local high temperature sufficient to crack any part of the fuel. This usually occurs near the exhaust valve.

Selection of Bore.—The best bore from the standpoint of kerosene burning is difficult to ascertain. Experience shows that $4\frac{1}{4}$ in. for L-head types seems to give the best results; a larger bore may give the best results for a valve-in-the-head type of cylinder. There is no more interesting problem in internal-combustion engineering than the influence of careful design on the bore, which establishes the most favorable number of cylinders for burning fuels heavier than gasoline.

In working out the combined intake and exhaust manifolds that vaporize the fuels in the mixture during its passage to the cylinder the convenient proximity of the intakes and exhausts makes the L-head and valve-in-head types of cylinders the most frequently used. Tractor engines operate from 50 per cent. to full load practically all the time and with comparatively small variation in speed. The four-cylinder four-cycle engine is therefore easily applicable to burning kerosene, inasmuch as so far as vaporization is concerned the only difficult condition to be met is that which occurs when the engine is throttled.

Because of the narrower explosive-mixture range or air-to-fuel ratios, all of the above favorable factors combine to permit the practical burning of kerosene more easily in the four-cylinder than in any other type.

We have established an ultimate type of tractor engine when we say it shall be a

four-cylinder four-stroke cycle vertical engine capable of delivering from 16 to 40 h.p. continuously without showing distress at full or overload and of running at speeds varying between 750 and 1230 r.p.m. according to the bore. This engine should run, under favorable conditions, 40,000,000 revolutions between crankpin-bearing adjustments, 80,000,000 revolutions between adjustments of main bearings, and 43,000,000 revolutions between grindings of valves.

Important Elements of Design

Having decided upon a definite type, it may be well to enumerate the general elements of design that need the most attention.

1—A careful layout of the combustion-chamber in order to secure a high uniform temperature of the walls; this means no pockets for steam in the jacket, and a correct direction of cooling-water flow.

2—Valves arranged to secure favorable heat flow in the exhausts toward the water-jacketed seat and valve guide.

3—Piston head cooled so as to keep temperature of its center below cracking point of fuel.

4—Efficient circulation of water about the spark-plugs.

5—Pistons and rods of light weight.

6—Piston and rings with clearance so as to secure high-temperature performance at medium speed.

7—Stiff crankshaft of material of high elastic limit to withstand abrasion with ample main and crank bearings, particularly center main bearing.

8—Lubrication system designed to convey extraneous heat of pistons, lower cylinder wall, crankcase bearing webs and sides into a sump in which cooling means can be provided to dissipate such heat. The lubrication should be such that if any part fails, auxiliary systems are always at work to prevent sudden failure of bearings and great damage to the engines. The high bearing pressures and temperatures necessitate the use of medium and heavy oils. Breathers that prevent sand and dust from entering the engine should be used. When either the present gasoline or straight kerosene is burned, the increasing content of kerosene results in a rapid drop in viscosity. The oil should therefore be renewed frequently.

9—Crankcase is best in design that is the stiffest and dissipates heat the best.

10—Heavy flywheels to meet sudden peak loads and thus relieve the crankpin bearings of the most severe pounding that they receive.

11—Air cleaners should be used to remove the dust and sand from the entering air.

12—A self-contained governor of both the maximum and constant-speed type is important.

13—Provision for burning kerosene. This involves the following considerations:

a—In tractor service when the load remains at over half the full value, kerosene gives reasonable satisfaction, provided properly proportioned combined intake and exhaust manifolds be used and the starting be made on gasoline.

b—Under such conditions the loss in volumetric efficiency due to heating the intake charge results usually in a decrease of from 10 to 20 per cent. in the maximum horsepower output, whether gasoline or kerosene is used.

c—When the engine speed increases, the necessity for heat in the intake is less, while when the speed decreases more heat is neces-

sary in the intake. At full speed and power output, slight heating of intake will suffice.

d—A properly designed combustion chamber, removing the necessity of water injection, is required.

e—The principles of the science and art of burning kerosene, as indicated by my experience, are set forth in several papers by Dr. Charles E. Lucke, and the author testifies to the correctness of his conclusions.

f—A kerosene engine does not carbonize any more than does a gasoline engine; in fact, it stays cleaner than the gasoline engine if the fuel is only comparatively well vaporized.

g—When kerosene is well vaporized so that the mixture reaching the cylinder is in a dry state, a kerosene engine with a correctly designed combustion chamber will not be heated so much as will a gasoline engine.

h—In burning any grade of fuel the carburetor meters and atomizes the fuel; the manifold vaporizes the mixture; the combustion chamber burns it. Of all these the carburetor is the most nearly perfect. The manifolds are next in efficiency. The engines in their present form are the least able to perform their functions in attempting to burn kerosene. The development therefore of kerosene-burning in engines of the prevalent types should start with the engine and end with the carburetor.

Author's Conclusion

No doubt the greatest criticism of the four-cycle engine is its low thermal efficiency. The future certainly has great things in store for the improvement of this cycle. Perfected systems of spraying the fuel under pressure may offer great opportunities for improvement in the four-cycle as well as in the semi-Diesel type.

The use of heavy fuels is bringing to the front the wonderful possibilities of the newly-developed high-pressure steam boilers. The boiler has been the weak point in steam-driven vehicles, but the modern high-pressure type, which delivers superheated steam at a pressure of from 800 to 1000 lbs. per sq. in., taken together with the four-cylinder vertical single-acting poppet-valve type of uniflow engine is producing results in thermal efficiency that rival the average performance of the four-cycle internal-combustion engine—particularly when burning cheap oil. After all it is a serious matter to carry the fire box in the cylinder and also to keep the latter clean.

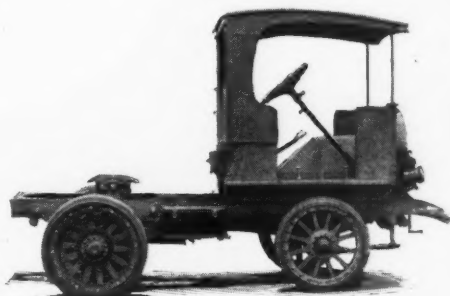
The determination of the ultimate type of tractor engine is really a problem needing the co-operation of engineer, salesman, consumer and manufacturer.

PACKARD MOTOR CAR Co. has purchased properties at 1020-26 Broad Street, Newark, N. J., as a site for a substantial building to serve as headquarters of the company in that city.

BROWN-LIPE GEAR Co., Syracuse, N. Y., recently elected the following officers: Alex. T. Brown, president; Willard C. Lipe, first vice president; Geo. W. Sponable, second vice president; Arthur E. Parsons, secretary and general manager, and E. H. Hungerford, treasurer. These officers with H. W. Chapin compose the board of directors. Mr. Chapin has retired from the general management of the Brown-Lipe Gear Co. so as to devote his entire time to the general management of the Brown-Lipe-Chapin Co.

THE WATSON FIVE-TON TRUCK-TRACTOR

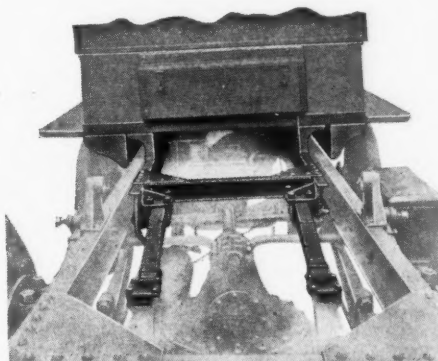
The Watson Wagon Co., of Canastota, N. Y., with over 25 years' experience in building heavy hauling equipment, and which is the manufacturer of the well-known Watson dumping wagon, is now manufacturing the "100 per cent." Watson tractor and five-ton trailer. The features



The Watson Truck-Tractor

Notice the heavy bumper, springs and frame. The wheelbase is 80 in. Also the flexible platform for attaching the dumping semi-trailer.

of this outfit are the ease of hauling, the quick interchangeability of trailers, the bottom dumping feature of the trailers and the sub-frame, on which is mounted the power plant and driver's seat. This sub-frame has a separate set of springs for



Showing the Special Subframe and Spring Suspension, Which Mean Long Life to the Power Plant

carrying its practically constant weight, thus reducing wear and tear of the power plant, and protecting it from shock and excessive vibration. This outfit is not new or untried, as it has been thoroughly tested out on hard contracting jobs and has stood the test.

The engine is a Continental four-cylinder, bore $4\frac{1}{2}$ in., stroke $5\frac{1}{2}$ in. The "L"-head type cylinders are cast in pairs. The carburetor is a Zenith, model L5, $1\frac{1}{4}$ in., with no adjustments. Ignition is by Bosch high tension magneto, model DU4; dry batteries and Bosch vibrating duplex coil are used for starting. A centrifugal pump circulates the water. Coil spring mounting is provided for the honeycomb radiator. A fly-ball type Pierce governor limits the speed. The engine is lubricated by a positively driven plunger pump system, with oil leads to the timing gears and the rear main bearings.

The clutch is a Brown-Lipe multiple disc dry plate, enclosed in flywheel housing. The transmission is also Brown-Lipe make, four forward speeds, with direct drive on fourth. Gears have $1\frac{1}{2}$ in. face and these and all shafts rotate on Timken roller bearings.

Axles

Both front and rear axles are Timken Detroit. The front is "I"-beam section, forged from nickel steel. Timken bearings are used on the wheel spindles and steering knuckle bolts. The rear axle has Timken-David Brown worm gears and is full-floating. Timken bearings are used throughout. The gear ratio is 10 1-3:1.

Brakes

Both hand and foot brakes are expanding shoes in drums on the rear wheels. The drums are $18 \times 3\frac{1}{2}$ in. Steering gear is a

The main frame is of 6 in. channel section steel and is equipped with a heavy bumper.

The sub-frame is supported in the rear by light torsion springs, and pivoted to the main frame in front. This gives a straight line drive under all conditions, as the entire power plant and driver's seats are mounted in it. Wear on the universal joints is also reduced by the straight line drive.

Springs

Springs are Sheldon make. The front main frame springs are light semi-elliptic, the rear of the main frame having heavy semi-elliptics. The rear sub-frame springs are light torsion springs.

All wheels are wood, the front having 34×4 in. single solid tires, the rear 36×5 in. duals, S. A. E. demountable type.

Short-Turning Capacity

One of the hundred per cent Watson truck-tractor and trailer features.



Gemmer, heavy worm and gear type, with a ratio of $10\frac{1}{2}$:1. The steering wheel is 22 in. in diameter and is located on the right side. Gear shift and brake levers are located in the center. Gasoline tanks with a capacity of 25 gals. are located under the driver's seat and gasoline is fed by gravity.

The wheelbase is 80 in.; tread, front, 61 in.; rear $64\frac{3}{4}$ in. The weight is 6250 lbs. The front wheels carry none of the load, the rear carrying 37 per cent. The maximum speed is 11 m.p.h. Equipment includes oil lamps, Klaxon, tools, jack, cab and curtains.



United Trucks Consigned to the French Government

This illustration depicts a string of two-ton United Motor Trucks, manufactured by the United Motors Company, of Grand Rapids, and consigned to the French government for use in the war zone. The use to which these heavy-duty trucks are to be put in the activities of the Allies has been kept secret by the purchasing agents of the French government. Not even the officials of the United Motors Company were advised as to the purpose for which the trucks will be used—they simply built them according to the specifications of the French agents. There has arisen, therefore, no little amount of speculation in the United organization regarding these trucks and their probable use. The peculiar body construction, with raked sides, and tarpaulin covers, has given rise to many theories. J. C. Wormley, United Sales Manager, has announced that the company will give souvenirs for the three most likely suggestions from the general public as to the probable use of the trucks by the French army.

Why is the CCJ the only truck paper a member of the Audit Bureau of Circulations? Here's food for thought

The Pioneer Special Tractor

POPULAR demand for a tractor of general purpose and of sufficient capacity to handle four plows, a small thresher, a 10 ft. road grader, or other implements of a size within this power range, has caused the Pioneer Tractor Mfg. Co., of Winona, Minn., to offer a new tractor, the Pioneer Special. This new model is a four plow tractor hav-

which requires no batteries, is used to supply current for ignition. Push rods are of forged steel, mushroom type, hardened and ground. Valve heads and stems are welded together, the former being of grey iron, the latter of carbon steel. Cams are drop forged carbon steel, hardened and ground.

Lubrication

Lubrication of main and rod bearings is by force feed, the oil passing through holes in the crankshaft to the rod bearings. The oil is filtered before passing through the pump again.

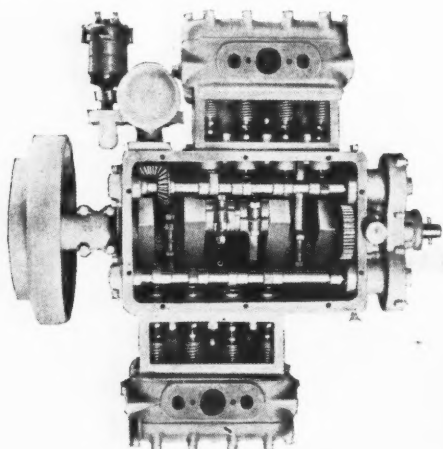
In the illustration of the engine it can be readily seen that accessibility has been provided for. Bearings are readily tightened, valves adjusted, and carbon removal

A large removable plate allows instant inspection of all parts.

No transmission gears are in use, thus utilizing the engine power with little loss from friction. Direct belt pulley drive from the engine is a feature.

Cooling

An entirely enclosed 30 gal. radiator made of brass and copper is used to insure resistance against corrosion and other destructive elements. The water is circulated by a centrifugal pump and a blast of cool air is drawn through the radiator by a driven fan. The frame is of channel and angle steel, hot riveted, and wheels are of the built-up suspension type. The rear wheels are 60 x 18 in. The front are 6 x 36 in. Both front and rear ends are spring mounted. The gas tank capacity is 35 gal. Weight is 8000 lbs.



Pioneer Special Engine

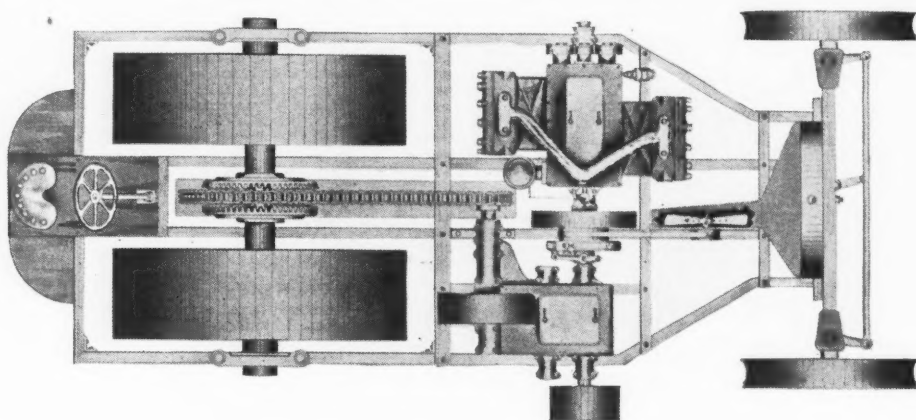
Shown with valve-mechanism covers and crankcase cover removed. Notice the mushroom push-rods, and bevel drive to the timer. The bore is 5½ in., stroke 6 in.

ing sufficient power to handle four plows under average soil conditions 5 to 9 in. deep. It is equipped with a four-cylinder engine, three speed transmission, roller chain drive to the rear differential, details of these and other parts being given in the following paragraphs.

Engine

The engine has cylinders cast in pairs, opposed, with removable heads, with a bore of 5½ in. and a stroke of 6 in. The crankshaft is hammered-forged of high carbon steel. There are two main bearings, 2½ x 7½ in., and the connecting-rod bearings are 2¾ x 3 in. Connecting-rods are I-beam section and fitted with babbit bearings.

Pistons are of close grain, grey iron, and are fitted with three 7-16 in. rings each. The governor is of the fly-ball throttling type enclosed and running in oil. A high tension magneto, impulse starting type



Plan View of Pioneer Special Tractor

This illustration shows the general lay-out of the various units. Drive from engine to belt pulley is direct, through the clutch only, and no transmission gears are in mesh. Drive from transmission shaft to the rear wheels is by roller chain.

and valve grinding are facilitated by the removable cylinder heads.

Transmission

The transmission has three speeds forward and one reverse, and has cut steel spur gears. The forward speeds are 1¾, 2½ and 4 m.p.h., reverse being 2 m.p.h. Final drive from the transmission to the rear differential is by a 2 in. roller chain. The transmission is a complete unit in itself. All gears are enclosed in a cast iron case protecting them from foreign matter.

TRACTOR CLUB, Kansas City, recently elected the following officers and directors: E. J. Anderson, president; H. L. Thienna, vice-president; Guy Hall, secretary-treasurer; W. R. Ellis, H. A. Kaufmann, G. C. Weyland and L. J. Brooking. A truck show will be held during the week of the automobile show.



The Pioneer Special

Has four-cylinder engine, 5½-in. bore, 6-in. stroke; three speeds forward and one reverse; wheelbase, 116 in.; weight, 8000 lbs.



Saves \$13,500 in Labor in Three Years

This two-ton automatic electric industrial tractor has saved the Bullock Electric Company, of Cincinnati, Ohio, \$13,500 in labor in three years. In that time its upkeep has amounted to only \$50. The original tires are still intact.

Advertising appropriations bring greatest returns when expended in the CCJ

Factors Controlling Maximum Over-All Dimensions of Motor Trucks

Dimensions of Streets, Buildings, Ferryboats, Etc.,
Limit Sizes of Trucks — While Desire for Haulage
Economy Leads Owners to Demand Still Larger Vehicles

By A. F. MASURY, Chief Engineer International Motor Company, New York

IT is the purpose of this paper to present some existing and characteristic conditions that control and restrict the maximum overall dimensions of motor trucks and that prevent attainment of the higher efficiency that can be expected to result from an increase of vehicle size.

In general the restricting factors are physical and legal, the legal being to a great extent directly determined by and the result of the physical.

Motor truck designers are being constantly confronted by engineering and contracting problems that would require motor trucks of capacities greater than at present existent and practical. The designer finds few things in the nature of pure automobile engineering problems that would prevent him increasing the size of trucks.

The weight and dimensions of materials to be transported are constantly increasing, and it is the materials that are of prime importance in determining the size and type of vehicle to be used in their transport.

Existing Physical Factors

(A) OVERALL HEIGHT.

The overall height of present motor trucks seldom exceeds 12 ft.

The height is limited by the headroom necessary to drive under such structures as:

Railroad Bridges (Grade Crossings).
Enclosed or top bridges.
Elevated Railroad Structures.
Overhead Trolley Wires.
Doorways of Buildings.
Ferryboats.

Railroad grade crossing bridges seldom provide less than 12 ft. headroom.

Enclosed top bridges do not always provide as much as 14 ft. clearance.

The doorways of modern garages, built to accommodate present motor trucks, are made with 12 ft. 3 in. headroom. However, few garage doorways exceed 10 ft. in height.

(B) OVERALL WIDTH.

The overall widths of present motor trucks are in very few instances in excess of 96 in. This dimension is limited by the distance between parts of such structures through which vehicles must be driven, as:

Doorways.
Elevators in Buildings.
Ferryboats.

Doorways of modern garages, built to accommodate present day motor trucks, are made with a clearance between the butts of at least 10 ft. 9 in., which allows sufficient space for the fastenings of the doors without interfering with vehicles as they pass in or out.

Elevators in modern truck garages are made 11 ft. wide.

Overall widths are to a great extent controlled by conditions that minimize the clearance between passing vehicles and the clearances between passing vehicles and stationary objects, as posts, trees, poles, ele-

Carteret Ferry Company

Overhead clearance of boats	13 ft. 0 in.
Clearance of passageways	9 ft. 6 in.
Passageway between combings	7 ft. 6 in.

TABLE A—Most Important Average Dimension of Trucks

Capacity	Wheelbase	Extreme Length	Length, Back of Cab	Extreme Width in inches	Height of Loading Platform in inches Empty	Clearance Loaded in inches
Type 1						
1	12 ft. 0 in.	16 ft. 0 in.	9 ft. 2 in.	68	36	32
2	13 ft. 0 in.	17 ft. 0 in.	9 ft. 2 in.	68	38	34
3	13 ft. 6 in.	20 ft. 6 in.	11 ft. 0 in. to 11 ft. 6 in.	87	42	38
4	14 ft. 6 in.	21 ft. 6 in.	12 ft. 0 in. to 12 ft. 6 in.	87	42	38
5	15 ft. 6 in.	22 ft. 6 in.	13 ft. 0 in. to 13 ft. 6 in.	87	44	38
7½	16 ft. 6 in.	23 ft. 6 in.	14 ft. 0 in. to 14 ft. 6 in.	87	44	38
Type 2						
3	11 ft. 6 in.	18 ft. 3 in.	12 ft. 6 in.	87	42	38
4	12 ft. 6 in.	30 ft. 3 in.	14 ft. 6 in.	87	42	38
5	13 ft. 6 in.	22 ft. 3 in.	16 ft. 6 in.	87	44	38
7½	14 ft. 0 in.	23 ft. 3 in.	17 ft. 6 in.	87	44	38
Type 3						
5	11 ft. 10½ in.	18 ft. 1 in.	14 ft. 0 in.	93½	46	40
7	13 ft. 4½ in.	20 ft. 1 in.	16 ft. 0 in.	93½	46	40
10	14 ft. 2½ in.	22 ft. 1 in.	18 ft. 0 in.	93½	46	40
Power-dump						
5	11 ft. 9 in.	16 ft. 5 in.	8 ft. 3 in.	87	44	39
Truck, Type 1						
7½	12 ft. 10 in.	17 ft. 5 in.	9 ft. 3 in.	87	44	39

vated railroad pillars, curbs, etc., and that make negotiation both difficult and dangerous.

Many state roads are paved over a width of but 16 ft.; country roads are usually narrower than this.

The difficulties of operating in congested city traffic tend also to restrict widths; small vehicles are more easily handled.

The following tabulation shows the maximum width and height of motor vehicles allowed on the ferries going into the state of New Jersey:

Staten Island Transit Railway Company

	Overhead Clearance	Width
Ferryboat, Tottenville...	12 ft. 4 in.	7 ft. 5 in.
Ferryboat, Perth Amboy	12 ft. 6 in.	7 ft. 7 in.

Public Service Railway Company

Bergen Point			
Boat	Height	Width Between Wheel Guards	
Bayonne	11.7	10.0	7.9
Public Service...	15.5	8.2	6.6
Public Service...	15.5	9.9	9.1
Edgewater			
Englewood	10.9	9.1	7.1
Leonla	12.8	9.3	7.3
Edgewater	10.9	9.6	8.0
Fort Lee	12.2	9.9	7.7

	Height	Width
Penna. R. R.	12 ft. 4 in.	10 ft. 0 in.
D., L. & W. R. R.	12 ft. 2 in.	9 ft. 6 in.
Erie R. R.	12 ft. 6 in.	10 ft. 6 in.
Central R. R.	12 ft. 6 in.	10 ft. 0 in.
West Shore R. R.	12 ft. 0 in.	8 ft. 0 in.
Penna. R. R. at Camden		8 ft. 6 in.
Penna. & Reading R. R.		8 ft. 6 in.

(C) OVERALL LENGTHS.

The material to be transported is the most important factor controlling length. Overall lengths of existing motor trucks seldom exceed 24 ft. Overall lengths of tractors and semi-trailers seldom exceed 35 ft. Ladder wagons for fire department use sometimes attain lengths of 40 to 45 ft. Structural steel girders, telegraph poles, timbers and similar materials sometimes in excess of 60 ft. are transported by tractors and semi-trailers.

Tractor and trailer trains have attained lengths of over 80 ft., but are difficult to handle because the trailer "cut under" on turns.

Lengths are also controlled and restricted by the difficulties encountered in negotiating turns, particularly where roads are narrow and cross at acute angles and stationary objects as posts, poles, pillars, trees,

etc., are located in close proximity to the sides of the roads.

It is, of course, obvious that wheelbase length is the most important factor that determines the turning radius of motor vehicles and that the radius increases as the length increases. Existing structures tend to restrict length by making negotiation difficult.

Modern truck garages, built to accommodate present vehicles, require posts which are spaced at least 16 ft. 6 in. from the walls and 22 ft. apart; this allows

three trucks to be backed in between the posts and allows the front wheels of most trucks to project beyond the posts. Aisles about 25 ft. wide provide turning space, which is usually sufficient for the trucks to be driven out from their positions. When a large number of trucks are stored, the difference in the sizes of small and large trucks allows this arrangement to be worked out with economy of space. These dimensions can be properly considered as of maximum average. Elevators of modern truck garages are made 24 ft. long. Platform scales for weighing modern motor trucks are built to accommodate vehicles having a wheelbase length of 16 ft.

Trucks may be divided into three classes, according to the arrangement of the engine and the driver's seat:

1. This is the usual touring car type; the engine is over the front axle, the driver and control are behind the engine.

2. In this type the engine is over the front axle; the driver and control are directly above the engine.

3. The engine is over the front axle; the driver and control are on one side of the engine and the helper is on the other side.

Types 2 and 3 conserve the length of the chassis, as less space is taken for the driver's seat and control, thus allowing a longer loading platform in proportion to the wheelbase than type 1.

The position of the operator's seat, whether back of or over the engine, usually affects the dimension of length to a greater extent than the height. When the seat is placed back of the engine about 40 in. more frame length is required.

Tables A, B and C list motor truck data and show the most important, and what can

TABLE B—Turning Circles

Type	Capacity	Wheelbase	Diameter of Turning Circle in feet
Type 1	1-ton	10 ft. 6 in.	47
		11 ft. 6 in.	53
		12 ft. 6 in.	55
Type 1	1½-ton	10 ft. 6 in.	47
		11 ft. 6 in.	53
		12 ft. 6 in.	55
		13 ft. 6 in.	60
		14 ft. 6 in.	61
Type 1	2-ton	10 ft. 6 in.	47
		11 ft. 6 in.	53
		12 ft. 6 in.	55
		13 ft. 6 in.	60
Type 1	3-ton	12 ft. 6 in.	55
		13 ft. 6 in.	59
		14 ft. 6 in.	61
Type 1	4-ton	12 ft. 6 in.	55
		13 ft. 6 in.	59
		14 ft. 5 in.	61
Type 1	5-ton	12 ft. 6 in.	57
		13 ft. 6 in.	62
		14 ft. 6 in.	68
		15 ft. 6 in.	71
Type 1	7½-ton	12 ft. 6 in.	57
		13 ft. 6 in.	62
		14 ft. 6 in.	68
		15 ft. 6 in.	71
		16 ft. 6 in.	74
Type 2	3-ton	11 ft. 0 in.	47
		11 ft. 6 in.	49
		12 ft. 0 in.	51
Type 2	5-ton	11 ft. 6 in.	53
		12 ft. 6 in.	57
Tractor	3-ton	10 ft. 4 in.	*40
		10 ft. 8 in.	*41

* The trailer will usually cut under.

TABLE C—Important Dimensions and Turning Radii of Type 1, Trucks and Tractors

Tons Capacity	Wheelbase Inches	Width		Height to Top of Cab Loaded		Turning Radius in Feet	Length of Cab Back of Cab in Inches
		Chain Drive	Worm Drive	Chain Drive	Worm Drive		
1	132	73¾	72¾	93¼	93½	205	108
1	144	73¾	72¾	93¼	93 11-16	217	120
1½	144	73¾	73¼	93 13-16	94¾	217	120
1½	162	73¾	73¼	93 13-16	94¾	241	144
2	144	73¾	73¼	94	94¾	217	120
2	162	73¾	73¼	94	94¾	241	144
3½ Tractor	119	84¾		98¼		180¾	*21 87
3½	156	84¾		98 3-16		225¾	25 132
3½	168	84¾		98¾		249¾	26.3 156
3½	180	84¾		98 1-16		273¾	26.6 180
5½ Tractor	119	90¾		98¾		180¾	*21 87
5½	156	90¾		98 5-16		225¾	25 132
5½	168	90¾		98¾		249¾	26.3 156
5½	180	90¾		98 3-16		273¾	26.6 180
7½ Tractor	119	93		98¾		180¾	*21 87
7½	156	93		98¾		225¾	25 132
7½	168	93		98¾		249¾	26.3 156
7½	180	93		98¾		273¾	26.6 180

* The trailer will usually cut under.

TABLE D—Factors in the Cost of Motor-Truck Operation

Capacity in Tons.	Average Cost of Chassis.	Miles per Hour.	Driver's Salary per Year.	Garage per Month.	Miles per Day.	Maintenance per Year.	Gasoline per Year.	Oil and Grease per Year.	Tires per Year.	Interest During Life.	Insurance During Life.	Depreciation During Life.	Cost per Year.	Miles of Life Based on Mileage per Year.	Life in Years.	Cost per Life.	Cost per Day.	Tire Cost per Mile.	Gasoline Cost per Mile.	Miles of Use per Year.
1	\$1,963	19	\$780 830 900	\$20 20 20	40 50 60	\$120 240 360	\$300 450 675	\$120 190 270	360 540 810	\$408.75 231.75 117.76	\$260.70 147.00 75.00	\$1,626 833 426	\$2,197.78 3,106.78 3,531.78	100,000 85,000 65,000	8.3 4.7 2.4	\$18,241.74 14,601.86 8,476.35	\$7.33 10.36 11.77	\$0.03 0.03 0.03	\$0.025 0.025 0.025	12,000 18,000 27,000
1½	2,225	18	780 830 900	21 21 21	35 50 60	135 270 360	276 395 710	102 150 270	341 488 878	533.97 317.06 133.50	331.00 202.00 85.00	2,140 1,276 535	2,199.73 2,698.72 3,728.73	100,000 85,000 65,000	9.6 5.7 2.4	21,117.41 15,922.51 8,948.95	7.33 9.00 12.43	0.0325 0.0325 0.0325	0.0262 0.0263 0.0262	10,500 15,000 27,000
2	2,918	17	780 830 900	22 22 22	35 50 60	150 300 450	288 415 660	75 150 225	393 563 900	663.33 408.52 246.96	461.00 283.00 136.00	2,660 1,818 789	2,361.44 3,067.44 4,026.44	95,000 85,000 65,000	9.1 5.6 2.7	21,489.10 17,177.66 10,877.39	7.87 10.22 13.42	0.0375 0.0375 0.0375	0.0274 0.0276 0.0275	10,500 15,000 24,000
3	3,575	15	780 830 900	23 23 23	30 50 60	180 360 540	292 487 781	75 150 225	404 678 1,081	893.75 473.68 241.31	572.00 303.00 154.00	3,575 1,989 1,018	2,233.39 3,612.39 4,529.35	90,000 80,000 65,000	10.0 5.3 2.7	22,333.90 19,145.67 11,716.35	7.44 12.04 14.43	0.045 0.045 0.045	0.0324 0.0324 0.0324	9,000 15,000 24,000
4	4,066	14	780 830 900	24 24 24	30 50 60	240 480 720	360 600 840	75 150 225	450 750 1,025	1,016.50 538.94 364.95	650.00 344.00 195.00	4,066 2,140 1,210	2,761.31 3,666.31 4,566.31	90,000 80,000 65,000	10.0 5.3 3.0	27,613.10 19,431.44 13,698.93	9.20 12.22 15.22	0.05 0.05 0.05	0.04 0.04 0.04	9,000 15,000 21,000
5	4,500	12	800 900 1,000	25 25 25	30 50 70	240 480 720	406 678 948	90 180 262	540 900 1,260	1,125.00 596.25 337.50	720.00 311.00 216.00	4,500 2,380 1,350	2,920.50 4,072.50 5,124.50	90,000 80,000 65,000	10.0 5.3 3.0	29,205.00 21,184.25 15,373.50	9.74 13.58 17.08	0.06 0.06 0.06	0.045 0.045 0.045	9,000 15,000 21,000
7½	5,400	9	800 900	26 26	25 40	255 510	395 630	94 150	750 1,200	1,525.50 837.00	976.00 535.00	5,400 2,348	3,367.40 4,463.40	85,000 75,000	11.3 6.2	35,051.62 27,673.08	11.22 14.88	0.10 0.10	0.0526 0.0525	7,500 12,000
10	5,500	7	800 900	28 28	25 40	270 540	468 750	94 150	1,200 1,920	1,553.75 852.50	994.00 545.00	5,500 3,410	3,943.50 5,371.50	85,000 75,000	11.3 6.2	44,561.55 33,303.30	13.15 17.90	0.16 0.16	0.0624 0.0625	7,500 12,000

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TABLE E—Motor Truck Operating Costs

Capacity in Tons.	Cost of Chassis with Standard Equipment.	Cost of Body.	Total Investment.	Interest on Half Total In- vestment @ 6 Per Cent.	Fire Insurance @ 2 Per Cent on 80 Per cent of Total Investment.	Fixed Depreciation, Ex- clusive of Tires, @ 10 Per Cent.	Maintenance.	Tires.	Gasoline.	Oil.	Total Cost per Annum.	Total Cost per Day.	Total Cost per Mile.				
							Per Mile. Per Year.	Per Mile. Per Year.	Per Mile. Per Year.	Per Mile. Per Year.							
1.....	\$2,150	\$200	\$2,350	\$ 70.50	\$37.60	\$216.00	\$0.015	\$135.00	\$0.026	\$234.00	\$0.0313	\$281.70	\$0.006	\$ 54.00	\$2,308.80	\$ 7.70	\$0.246
2.....	2,800	225	3,025	90.75	48.40	281.65	.02	180.00	.03	270.00	.0357	321.30	.008	72.00	2,544.13	8.48	.131
3.....	3,400	250	3,650	109.50	58.40	342.06	.03	270.00	.045	405.00	.050	450.00	.02	180.00	3,094.90	10.32	.175
3½.....	3,650	250	3,900	117.00	62.40	361.55	.03	270.00	.045	405.00	.050	450.00	.015	135.00	3,080.96	10.27	.0978
4.....	4,000	300	4,300	129.00	68.80	404.00	.04	360.00	.055	495.00	.071	639.00	.025	225.00	3,600.80	12.00	.08
4½.....	4,800	300	5,100	153.00	81.60	481.50	.04	360.00	.045	405.00	.056	450.00	.015	135.00	3,346.10	11.15	.0743
5.....	4,250	300	4,550	136.50	72.80	422.99	.04	360.00	.0525	472.50	.054	486.00	.02	180.00	3,410.79	11.36	.069
5½.....	5,800	300	6,100	183.00	97.60	577.00	.04	360.00	.05	450.00	.054	486.00	.015	135.00	3,568.60	11.90	.061
6.....	4,500	300	4,800	144.00	76.80	445.00	.045	405.00	.07	630.00	.080	720.00	.03	270.00	3,970.80	13.23	.059
7.....	4,600	300	4,900	147.00	78.40	451.84	.045	405.00	.0625	562.50	.062	558.00	.025	225.00	3,707.74	12.36	.055

The above table has been computed on the basis of: 300 working days per year; 30 miles per day; 9000 miles per year; 100,000 miles, life of truck; 25c. per gallon gasoline; 60c. per gallon lubricating oil; \$26 per week wages; \$20 per month garage.

be properly considered as average dimensions of motor trucks, as they are at present met with in practice.

Vehicles of maximum dimensions as follows have been either projected, designed or built and are in few instances extreme, the figures serve to show simply a few conditions.

1—5½-ton tractor-trailer for transportation of milk, width 90½ in., height 11 ft., length 321¼ in.

2—Truck equipped with body to carry timbers 85 ft. long.

3—6½-ton, 180½ in. wheelbase truck designed with racks to carry steel, width 96 in.

4—2-ton, 10 ft. wheelbase truck designed with special semi-trailer of 20 ft. wheelbase to transport aeroplane 30 ft. long.

5—7½-ton tractor designed with special semi-trailer, which carries a foam tank of 15 tons capacity, height 10 ft. 6 in., length 26 ft. 9 in.

Legal Factors

A few of the restrictions imposed by legislation will suffice to show that the maximum dimensions allowed are in some instances even less than those of many present motor trucks and in other instances are but slightly larger and it appears that average motor trucks considered as a whole are rapidly approaching their legal limits.

The legal restrictions cited, while they are few in number, are fairly representative of the average legal maximums that would be determined by a more exhaustive study.

A few legislative regulations restricting dimensions:

Chicago Ordinance, passed May 17, 1915, under subject: Tractors and Trailers: Regulations for Speed, Size and Capacity.

Section 6 limits as follows:

Maximum overall length of truck and trailer 40 ft.

Maximum overall width of truck and trailer 102 in.

Section 7. Permits issued to operate train of trailers up to 100 ft. long between 8 P. M. and 5 A. M. at 8 m.p.h.

Laws of Pennsylvania—90 in. maximum width over vehicle and load. Busses in

cities of first, second and third class and tractor engines may be 100 in.

Laws of Maryland—90 in. maximum width allowed; tractor engine may be 100 in.

1904 Motor Car Order (England) limits the width of heavy motor cars or trailers to 7 ft. 6 in.

Vehicles for military service in England are limited as follows:

Maximum width 90 in. for 3 ton trucks; 90 in. for trailers.

Ton-Mile Efficiency

High ton mile efficiency leads to big units which is shown by a comparison of the cost of operation of trucks of different capacities and is evidenced by Tables D and E.

Future

From the foregoing it will be seen that the present physical conditions restricting the overall dimensions have largely been the controlling factors in establishing the legal restrictions.

The present tendency in design is toward still larger units and is the result of the increase in ton mileage efficiency that is possible only with large units.

We can reasonably expect physical changes in the future that will take place

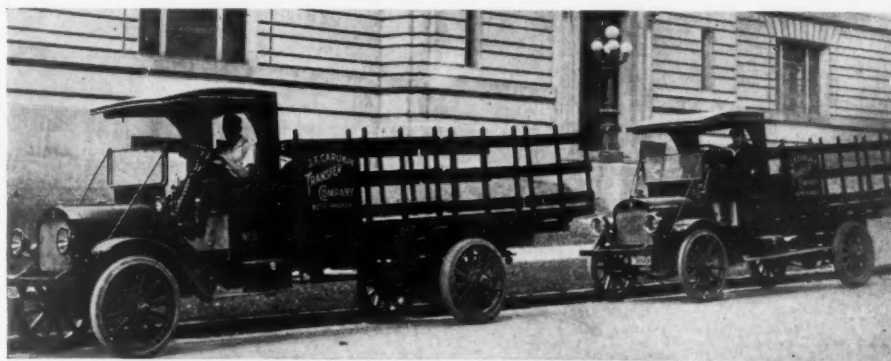
slowly and naturally and that will surely lead to conditions that will permit motor trucks to be increased in size far beyond the present legal maximum limits.

The amount of capital invested in the motor truck and its allied industries cannot be accurately ascertained and estimated figures are not available. However, it is obvious that it represents a proportion of the total money invested in the automobile and allied industries that is by no means small.

The National Automobile Chamber of Commerce estimates the number of commercial motor vehicles in the United States at 250,000, and the average cost of 1915 vehicles at \$2,000 each, 1916 vehicles at \$1,800 each.

The annual expenditures on the construction and maintenance of highways in the United States is \$250,000,000.

In face of these facts it does not seem unreasonable to expect that the inertia of money and the enlistment of engineering talent of the highest order in the industry will unite to accelerate change, and to overcome the present physical restrictions and the legal restrictions that together prevent the attainment of the maximum efficiency that it is possible for engineers to produce.



Grand Rapids Man Finds Transfer Business Profitable

An illustration of the financial possibilities of delivery trucks is found in the instance of J. F. Carukin, a young man at Grand Rapids, Mich., who started in two years ago to conduct a transfer business. He purchased three light delivery cars and two heavy-duty cars on the partial-payment basis. By using progressive methods and affording earnest competition, he built up a business which has given him a clean slate on all his cars. Besides paying for his trucks, which are still gilt-edge assets, he has accumulated a tidy account at his bank.

Everybody who is anybody in the truck industry reads the CCJ

Car and Accessory Salesmen Attention!

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If you are a keen observer it will be easy money for you.

1st	Prize	\$200
2d	"	100
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4th	"	30
5th to 10th, inclusive—\$20 each		

All you have to do is to ask the jobber, dealer, garage and repair man upon whom you call, which automobile directory he uses; send us the names of the dealers and the directories used, and letters containing the most good reasons why the trade thinks the **CHILTON AUTOMOBILE DIRECTORY** is best, most convenient and helpful to buyers.

Prizes will be awarded on the following basis:

To the largest number of names in the list of firms called and reported on—100 points.

For the letters with the best reasons—50 points; divided as follows:

NAMES				LETTERS			
Most—35 points				Best—15 points			
2d	—25	"		2d	—12	"	
3d	—20	"		3d	—10	"	
4th	—10	"		4th	—5	"	
5th	—5	"		5th	—3	"	
6th to				6th to			
10th	—1	"	each	10th	—1	"	each

This contest will start March 1st and will terminate June 1st. The contestant incurs no obligation. You do not have to subscribe to, contribute for, or buy anything.

For registration blanks and full details of the competition, write to The Contest

Editor, **CHILTON COMPANY**, Market & 49th Sts., Philadelphia, to send you blanks and full particulars of the \$500 prize offer.

This is a *real* opportunity. Let your impulse persuade you to write to-day, for now is the appointed time.



New Acme Three and a Half Ton Model

New Heavy-Duty Truck Follows the General Lines and Design of the One and Two-Ton Models

THE Cadillac Auto Truck Co., of Cadillac, Mich., builder of the Acme 1-ton and 2-ton trucks, has added a 3½-ton model to its present line. The design of the smaller Acme models has proved so satisfactory that the same design, providing of course for larger dimensions, will be employed in the manufacture of this new Acme model.

The Power Plant

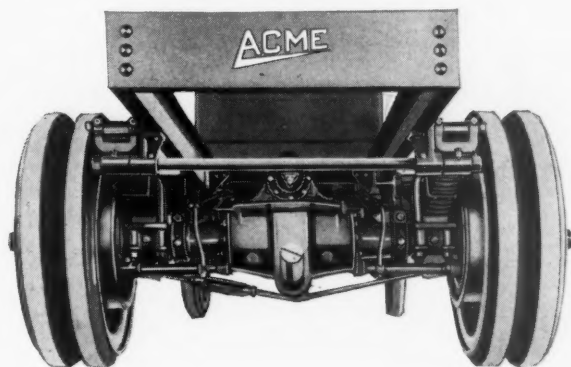
As on Acme one- and two-ton models the power plant consists of a Continental engine. For this truck the Type E is used; this is a four-cylinder engine, L-head, with cylinders cast in pairs, bore 4½ in., stroke 5½ in., developing 48 h.p. on brake test. Three point suspension is utilized. The engine is controlled by a Pierce governor limiting speed to 1200 revolutions and the truck to 14 miles per hour. Like the Acme one

and two ton models, this model is equipped with the Rayfield carburetor, Eisemann magneto and Stewart vacuum feed.

the hook-up of the shafts and gears is accomplished by a series of dog clutches, one part of the clutch being cut into the face of the gear, the other part sliding upon the squared shafts. The gears are mounted on roller bearings which are fitted into the gear hubs. The clutch arrangement is such that when the transmission is in high gear the other gears are perfectly idle. The face of the gears is 1¼ in. The propeller shaft



Chassis of the New Acme Three and a Half Ton Model



Rear-Axle Construction and Rear-Spring Suspension of the Acme Three and a Half Ton Truck

between engine and transmission, made of heat treated steel, is 1½ in. in diameter, equipped with two universal joints, and the shaft from transmission to rear axle is 1¼ in. in diameter, fitted with two universal joints. The transmission has three speeds forward and one reverse. The ratios are: 1st 4:1, 2d 2:1, 3d 1:1, reverse 4.125:1.

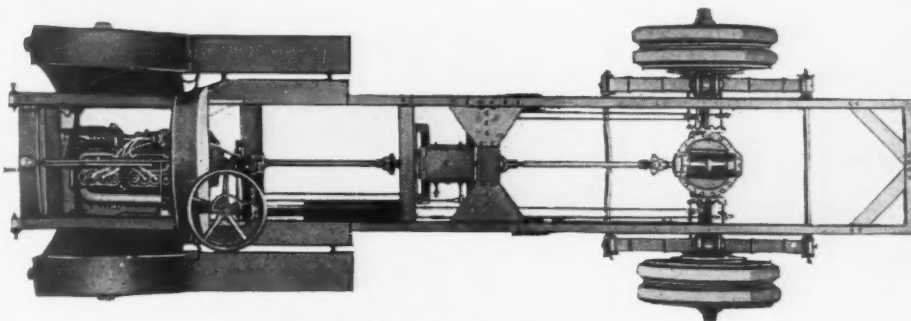
Front and Rear Axles

Timken axles and bearings are used. The rear axle is full-floating type. The axle shafts are forged in one piece, heat treated and splined on one end. The gear ratio

and two ton models, this model is equipped with the Rayfield carburetor, Eisemann magneto and Stewart vacuum feed.

Transmission

In the Acme one- and two-tonners the transmission is mounted in unit with the engine, but in the 3½-tonner Acme engineers see a necessity of dividing the weight instead of mounting the transmission in unit with the engine. Consequently the transmission is mounted amidship with three point suspension. The transmission is of the sliding clutch type with gears always in mesh. The gears instead of revolving with the shaft by means of splines, run free and



Plan View of the New Acme Truck

This three and a half ton model, just announced, has a Continental engine, transmission located amidships, and worm-drive rear axle

Merit wins—that's why the CCJ is the leader

is 10 1-3:1, giving a total reduction in low speed of 41 1-3:1. The service and emergency brakes are internal, expanding, within drums 21 in. in diameter on the rear wheels. The extra large braking service is adequate for efficient braking in any operating condition.

Type of Drive

On Acme one- and two-ton trucks Hotchkiss drive is utilized, taking the drive through the top leaf of the rear springs, made of special alloy steel for the purpose. In the Acme 3½-ton truck the drive is taken through radius rods which are semi-flexible, thereby eliminating the necessity of universal joints and allowing much more simple connections. The torque is taken by the springs the same as on the smaller Acme models.

Another change in Acme construction which might be noticed in the 3½-tonner is the adoption of a cast radiator tank as compared with the sheet metal tanks used on the smaller Acme models.

Radiator Mounting

The simple and efficient spring radiator mounting of the Acme has been a creditable success and Acme engineers have decided on a cast tank for this model on account of the heavier spring design which might cause impacts to be transmitted to the radiator which would be impossible with the one and two ton models with their lighter spring design. The radiator is detachable and is supported from the bottom on a cushioned base.

The frame of this 3½-ton model is of steel channel 8 in. section, strongly gusseted and reinforced. Semi-elliptical Detroit springs, self lubricating and fitted with bronzed eye bushings are used. The steering gear is of irreversible worm and nut type, left hand drive, 22 in. wheel and large post.

Chassis Measurements

The wheelbase is 168 in., the chassis length is 243 in., and the loading space is 150½ in. The chassis is designed to accommodate a 14 ft. body as standard. It will be furnished with longer wheelbase when desired. The tread is 66¼ in. front and 65¼ in. rear. The gasoline capacity is 27 gal.

The balance of the Acme truck and rigid construction of connections throughout the frame, the spring suspension, motor hanging, axle connections, etc., and the high standard of every unit, and the functioning of the same are predominating features.

This Acme truck will sell at \$3000 f.o.b. Cadillac. The equipment includes seat, lamps, horn, jack and tools. The company is especially equipped to manufacture bodies of all kinds and will submit drawings and specifications along any line desired.

Selden Truck Sales Co., Rochester, N. Y., has announced the following increase in prices on its commercial cars:

Model G, 1500 lbs., \$1850; model TL, 1-ton worm drive, \$1850; model TX, 1-ton internal gear, \$1385; model WL, 2-ton worm drive, \$2350; model JC, 2-ton internal gear, \$2150; model N, 3½-ton worm drive, \$3150.

STEWART HAS THREE MODELS

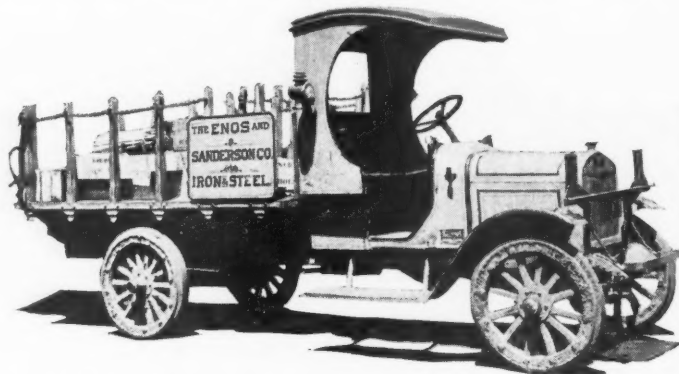
Announcement of the new line of the Stewart Motor Corp., of Buffalo, N. Y., reveals the fact that three models will be featured for 1917. The leader is designated as the model 6 of 1500 lbs. capacity, at a chassis price of \$795. This model can be obtained with a factory-made express body at \$870 complete. A loading space of 6½ ft. long, 45 in. wide and 53 in. high is specified. The body is reinforced at every point with malleable castings so that its rigidity

ity to transmit the power to the part of the wheel where it will have most force.

In addition to this internal gear rear axle and 4-cylinder engine, all Stewarts have Zenith carburetors, magnetos, 3-speed transmission and clutch of multiple disc dry plate type.

Purchasing Plan

By means of a special arrangement the Stewart people are offering a plan of easy payments by which, in the 1500-lb. model for instance, the dealer can sell a truck at



Stewart Model 4, One and a Half Ton Chassis, Price \$1485

The truck shown above has been fitted with a special stake body and channel-iron carriers mounted on front.

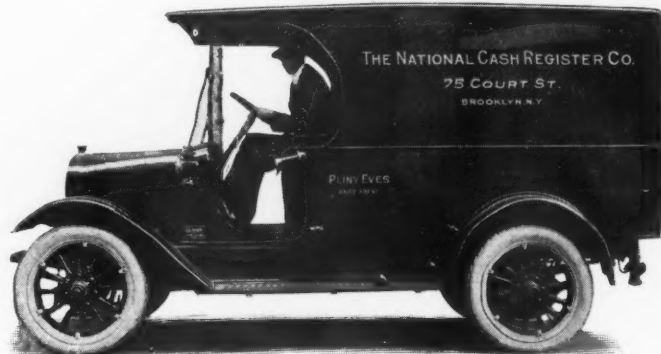
is unshakable. The other jobs are model 3, which is of 1-ton capacity, at a chassis price of \$1390, and model 4 of 1½-ton capacity, chassis price, \$1485.

The engine is a powerful overhead enclosed valve type, which develops 27 h.p.

\$261 down and \$1.85 a day for a year. The cost of carrying these deferred payments in no way deducts from the dealer's profits. It is carried by the ultimate purchaser, who does not really pay out anything for the privilege of easy terms, because it costs

Stewart Model 3, One Ton Capacity, Chassis Price, \$1390

This illustration shows a panel body mounted on the Model 3 chassis.



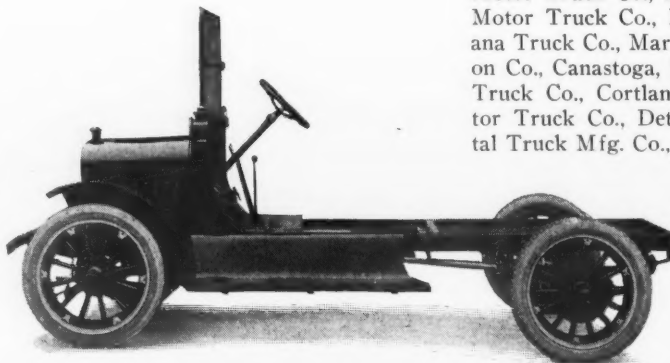
for the 1500-lb. Stewart and proportionately more for the others. Its main talking point is its lightness, simplicity, compactness and freedom from complications.

Internal-Gear Drive

The internal gear rear axle is being used on the Stewart because, in the belief of its designer, this insures big tire mileage, low gasoline consumption, lightness and the abil-

him no more than if he bought the insurance on the truck himself.

BOSCH MAGNETO Co., New York City, has signed contracts with the following concerns to use Bosch magnetos for the coming season: Nelson & LeMoon, Old Reliable Motor Truck Co. and the Zeitler & Lamson Truck Co., all of Chicago, Ill.; Maccar Truck Co., Scranton, Pa.; Lange Motor Truck Co., Pittsburgh, Pa.; Brinton Motor Truck Co., Philadelphia, Pa.; Indiana Truck Co., Marion, Ind.; Watson Waggon Co., Canastota, N. Y.; Brockway Motor Truck Co., Cortland, N. Y.; Federal Motor Truck Co., Detroit, and the Continental Truck Mfg. Co., Superior, Wis.



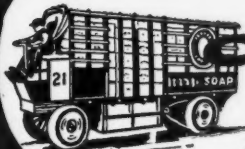
Stewart Model 6, 1500lb, Chassis \$795

Has four-cylinder engine, multiple-disc clutch and internal-gear rear axle.

Make your product pay—advertise in the CCJ

Firestone

Electric Compound Truck Tires



MOST Mileage from Tires and Battery Charge is something which concerns all men who use Electric Trucks. Speed saves time, resiliency saves batteries, and both save money.

In every trucking center you will find a Firestone Service Station.

A Firestone man will study your problem and show you how to obtain the greatest efficiency as regards electric tire equipment for every road, load and condition of service.

Within the complete line of Firestone Truck Tires there is the equipment exactly suited to your needs.

FIRESTONE TIRE AND RUBBER COMPANY
AKRON, OHIO Branches and Dealers Everywhere



Mandel Brothers Fleet, Chicago
Firestone Equipped

Fageol Truck Introduces Novel Features

Frame Flexibility, Magazine Oiling and Unusual Cooling Provisions Feature New California Truck

PRODUCTION of the new Fageol truck by the Fageol Motors Co., of Oakland, Cal., is expected to begin in March. The first model produced will be the 2-ton capacity. This will have a number of unique features, foremost among them being the magazine oiling. Cornelius T. Myers, M. E., of Detroit, designed this model for the Fageol Co. and embodied in it this oiling system, the basic idea behind this system being the elimination of grease as a lubricant because of its

oil to last for several weeks, and a wick feeds oil from this reservoir to the shackle pins. The front axle knuckle pins and all the steering connections will be lubricated by means of large wick oilers.

Unit Power Plant

The engine, a Waukesha 4 x 5 $\frac{3}{4}$ in., a Borg and Beck clutch, and a Cotta 3-speed transmission are mounted in unit and supported at three points. The truck will be so designed that, with a slight modification, it will use gasoline, distillate, or kerosene. The specifications include other well-known units as Spicer universal joints, Ross steering gear, Zenith carburetor, Bosch magneto, Janney-Steinmetz tank, and the Bosch starting and lighting system as optional equipment. Drive for the transmission is by a shaft with three universals, a bearing being placed at its middle. Final drive by worm gear. Brakes are internal expanding on the same drum.

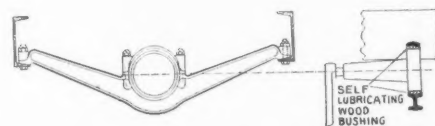
The radiator is of the cast head type with spiral gilled tube core. Since many of the Fageol trucks will be sold for service in the west and southwest and desert districts, ample radiation is important and has been cared for. A particularly efficient and newly designed fan, which is guaranteed to pass 40 to 50 per cent. more air than is usual, will be used, this, of course, tending to keep the cooling system cooler and therefore keep the engine cooler.

There will be special openings in the top of the hood to allow free exit of air behind

the fan and the very hot air which collects there. Other openings for the exit of air are also provided. For very unusual service arrangements can be made to secure additional radiation by the use of a larger core which will fit in the same headers.

Flexibility

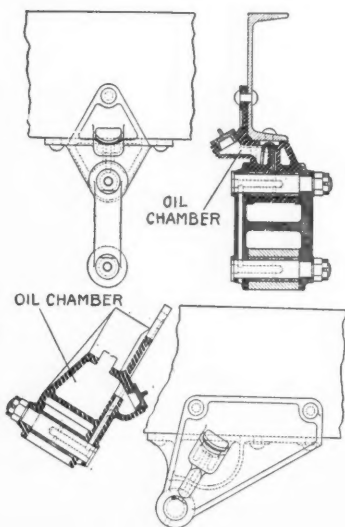
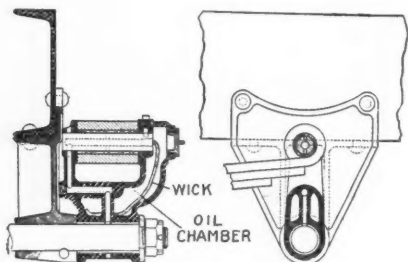
One of the illustrations shown herewith shows the universal action obtained from the third point of support of the unit power plant. The wood bushing is self-lubricating, requiring no attention and the



Third Power Plant Support

The flexibility of this third support of the unit power plant can be clearly seen. The wood bushing requires no lubrication.

engine is free to produce maximum torque even with great frame distortion. A similar flexibility of mounting will be noticed for the radiator. The two brackets rest on thick cork pads above the sills placed on the main frame. Three pads and springs between the brackets and nuts on the bolts allow a great deal of motion without distortion or strain on the radiator casting.



Magazine Oiling

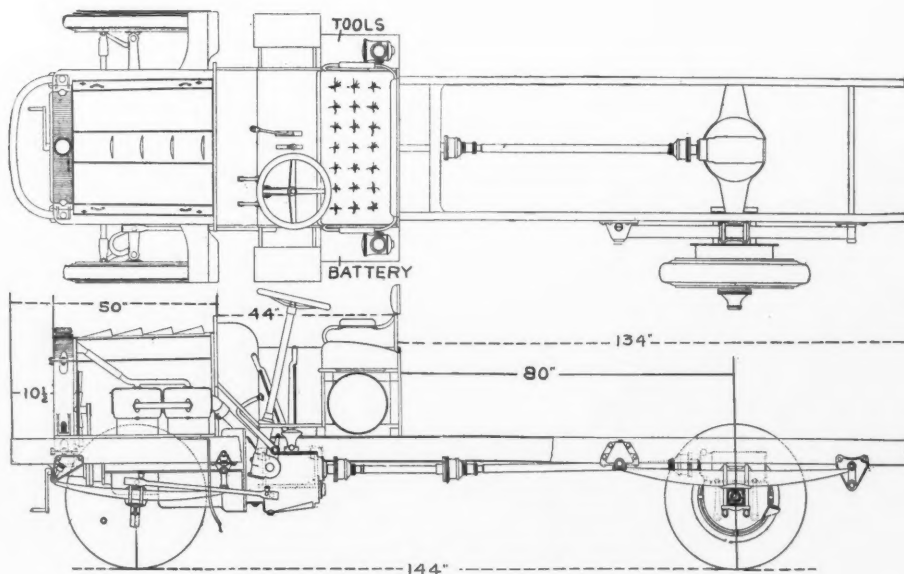
Herewith are shown sectional views of the magazine or wick oiling feature as applied to the spring bolts in this chassis.

dirt-carrying tendencies. A 5-ton model will be produced soon, to follow the same general lines of the 2-ton model.

The president of this new company is Louis Bill, formerly with the Jeffrey Co., and the vice-president is Webb Jay, of the Stewart-Warner Corp. A factory is now about completed for the manufacture of Fageol trucks and pleasure cars.

The springs are particularly long and flat under load, and special provision has been made that the shackle pins are lubricated.

In an accompanying illustration the oil reservoir is shown which will hold enough



Layout of the New Fageol Chassis

Notice the magazine oiling feature at the spring bolts. The hood is provided with ventilators in its uppermost, the outlines of which are seen in the lower illustration. This chassis has three universal joints from transmission to rear axle and a straight-line drive. Notice the small number of frame cross-members.

Why is the CCJ the only truck paper a member of the Audit Bureau of Circulations? Here's food for thought

What Signal "on the job" means to the manufacturer

THE best purchasing agent is the one who keeps the raw material coming in a steady flow to meet your manufacturing requirements; who handles his job so skillfully and reliably that you do not have to worry about him who, in a word, is "on the job."

The best sales manager is not the sensational, exploitive character who is continually endeavoring to impress you with his powers, but the energetic, able man who sells all you can make at a profit, and keeps your customers satisfied. "On the job" describes his ability, too.

The virtues of the factory superintendent who handles his work so easily and smoothly that the factory becomes a huge, efficient, producing organization may be summed up by the statement that he is "on the job."

Whether in dealing with men or machines, the expression describes the sum of all

desirable values. The man who is "on the job" does not need to explain—he delivers the goods.

In the same way the expression "on the job" boils down into a few words all the desirable qualities of a good motor truck. Its quality is best evidenced by your unawareness of its existence. You can dismiss the truck problem if you know your motor trucks are "on the job."

We did not fix the slogan "on the job" on Signal Trucks. It is the condensed expression of the experiences of Signal Truck users—it fits the occasion because it describes the Signal Quality. The circle of buyers for whom this applies is growing larger every day. Write

Signal Motor Truck Company
Detroit, Mich.



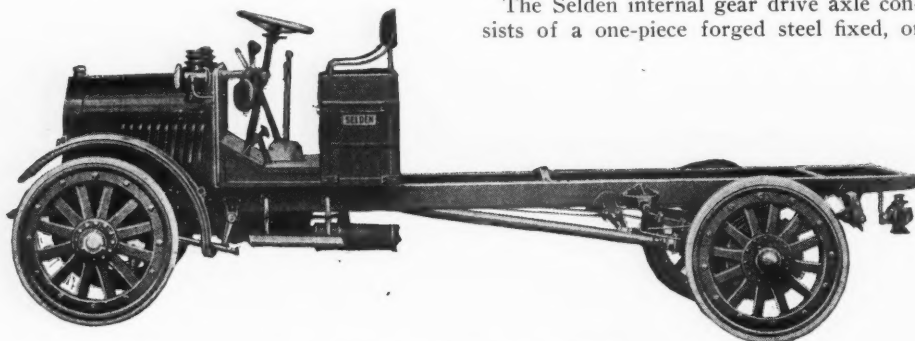
SELDEN ANNOUNCES ONE-TON INTERNAL-GEAR TRUCK

Equipped with internal gear drive and with a capacity of one ton, the latest model of the Selden line is announced at \$1385 f.o.b. Rochester, N. Y., where this line is manufactured by the Selden Truck Sales Co. This new truck is known as Model TC. It has a four-cylinder engine, with cylinders cast in block, "L"-head type, with a bore of $3\frac{1}{2}$

nut type with a 16 in. wheel, located on the right of the chassis. Tread is standard, the wheelbase, however, being optional, either 131 or 140 in. Front tires are 34 x 3 in. solids, the rear 34 x 4 in. single solid. For \$70 extra 35 x 5 in. pneumatic tires can be furnished. The fuel tank capacity is 20 gal., oil $1\frac{1}{2}$ gal. Approximately 75 per cent. of the load is carried on the rear axle. Driver's cab, rear fenders and electric starting and lighting system are extra.

The Selden internal gear drive axle consists of a one-piece forged steel fixed, or

load supporting, axle and a high speed jackshaft for transmitting the driving power to the wheels. The fixed axle is in one piece, with no joints to work loose or get out of order. The jackshaft, which is securely attached to the fixed axle and relieved of all carrying stress, transmits power to the rear wheels by the rolling contact of a spur pinion working with an internal gear. All working parts of the Selden internal gear drive axle are enclosed and protected from mud and grit, but they are also readily accessible. This axle is not sensitive to accidental lack of lubrication or minute misadjustments of parts. It is light in weight, allows a good ground clearance, is positive in action, economical and efficient. It is a very effective form of power transmission. Both torque and drive are taken through the springs, which are of the semi-elliptic type.



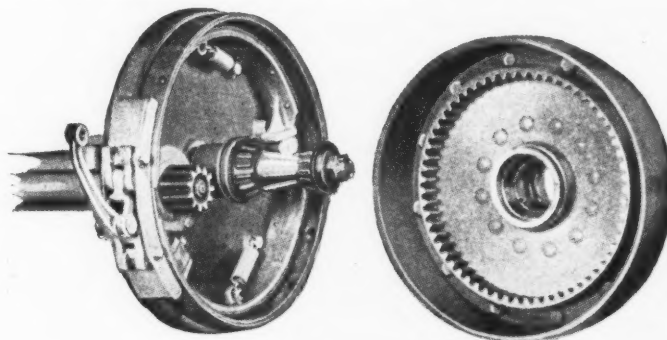
New One-Ton Selden Truck, \$1385

Can be had with 131 or 140 in. wheelbase at the same price, the loading space being 8 ft. 10 in. and 9 ft., 6 in. respectively. Is offered equipped with 35 x 5 in. pneumatic tires all around at \$70 additional

in. and a 5 in stroke. A dry disc clutch and selective sliding gear transmission are mounted in the frame with the engine and with the accessories complete a unit power plant. A centrifugal governor is used to restrict the speed. The engine is water cooled, equipped with a Stromberg carburetor and has high tension magneto ignition. The frame is of pressed steel, and the springs are semi-elliptic all around. Both sets of brakes operate on the rear wheels, and the steering gear is of the worm and

Selden Internal Gear

The brake drum and internal gear are removed from the axle, showing the internal and external brake assembly.



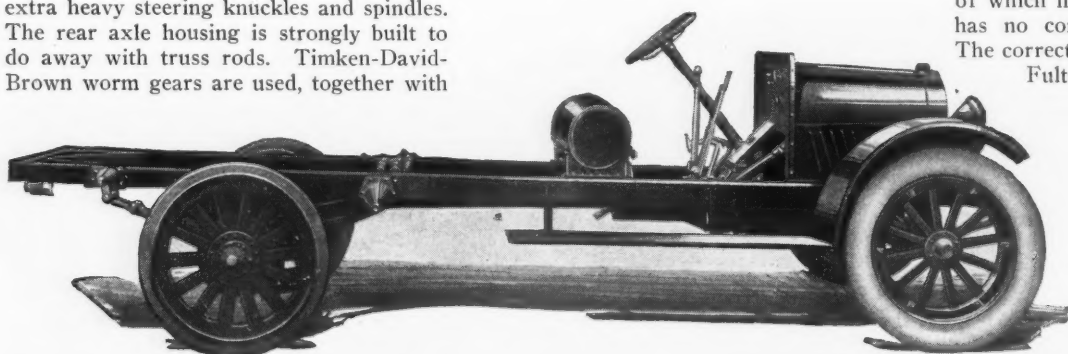
GEAR DEPARTMENT of the Baush Machine Tool Co., Springfield, Mass., will in the future be represented in the field by I. A. Daniels, who is thoroughly familiar with this line of business.

The Fully Equipped Maxfer One-Ton Truck at \$1195

The Maxfer Truck and Tractor Co., 203 South Michigan Avenue, Chicago, Ill., well known maker of units for converting the Ford chassis into a 1-ton truck, is producing a completely equipped 1-ton truck to sell at \$1195. This is a heavy duty truck with a 130-in. wheelbase, for fast or slow work. It has a four-cylinder engine, $3\frac{1}{2}$ x 5 in., with 192.4 cu. in. piston displacement and a formulae rating of 16.60 h.p., the power actually developed being over 30 h.p. Lubrication is by force feed with pump, and the splash system. The front axle is a drop forging I-beam section, with extra heavy steering knuckles and spindles. The rear axle housing is strongly built to do away with truss rods. Timken-David-Brown worm gears are used, together with

the Bailey non-stall differential gears. Tread is standard.

The electrical system is 2-unit type with all wires running in conduits. Front springs are no-center-bolt type. Rear springs are 51 x 3 in. The loading space is 6 ft. wide and 9 to 11 ft. long, according to the body. The frame is 3 1-16 in. thick by 4 in. deep. Rear tires are 34 x 4 in. solid, the front being pneumatics. The price, which is f.o.b., includes full equipment and cab, curtains, windshield and a standard platform body.



New Maxfer Truck Chassis

This one-ton truck is sold complete with electric starting and lighting outfit. The rear axle has Timken-David Brown worm-gear drive, and the Bailey Non-Stall Differential.

CLYDESDALE TRUCKS NOT MADE BY FULTON MOTOR TRUCK CO.

In the January Review of Eastern makers, the Clydesdale trucks were incorrectly listed as being manufactured by the Fulton Motor Truck Co., where Clydesdale trucks are simply offered for export by the Clyde Cars Co. and manufactured by the Krebs Commercial Car Co., Clyde, Ohio. The Fulton Motor Truck Co., of Farmingdale, L. I., was formerly known as the Clyde Motor Truck Co., and the similarity of names led to an error in our listing of the trucks concerned.

On page 24 an illustration of the Fulton truck appeared, the caption misrepresenting it as the Clydesdale Model L-30, $1\frac{1}{2}$ ton stake, chassis selling at \$1200. This information should refer to a Clydesdale truck of which no illustration was published and has no connection with the Fulton line. The correct caption should read as follows:

Fulton $1\frac{1}{2}$ ton stake, chassis, \$1090.

DESIGN

The Steering Gears
that
Predominate
on
Motor Trucks

"The Superiority of Ross Steering Gears begins right here. The fact that this screw is completely enveloped by the sleeve means that all the bearing surface of both screw and sleeve is constantly used. This enormous bearing surface is the thing that has made engineers choose

ROSS GEARS

as standard equipment on one hundred and twenty-four different makes of motor trucks.

The main working parts of the steering gear act in one straight line. It is a perfectly balanced unit, easy to operate, with safety and reliability. The enormous bearing surface minimizes the wear on the threads, and, together with the quality of the materials and the excellence of workmanship, insures satisfactory service and unusual durability."

Made in both the cross steering type and the fore and aft steering type. Write for catalog and further information.

THE ROSS GEAR & TOOL CO.
760 Heath Street Lafayette, Indiana



SANDOW TRUCKS

The Sandow, which is made by the Sandow Motor Truck Co., 2916-24 W. Lake Street, Chicago, Ill., is offered in five models: 1, 1½, 2, 3½ and 5-ton capacities. As with the majority of trucks manufactured in America the Sandow is made up of a number of standard units, which are combined in such a manner as to produce a harmonious ensemble. The units employed are the products of reputable parts manufacturers who have combined to contribute a portion of their highly specialized knowledge and experience in developing the Sandow line. The engine is a Continental, built to withstand hard usage and give the maximum efficiency under all conditions of service. A Bosch magneto furnishes the spark for ignition and is controlled by an ingenious device known as the Sandow spark knocker. Being located on the dash within easy reach of the driver, such manual operations as load and road conditions may demand, are easily accomplished. It is claimed to perfectly actuate the setting of the spark and to act as an efficient and reliable switch, so designed that the engine cannot be stopped until the spark timing has been fully retarded into safe position for cranking without the danger of kicking back.

On the Sandow trucks both axles and bearings are made by the Timken Detroit Axle Co. Transmissions and clutches used on all models are furnished by the Brown-Lipe Gear Co.

The spring suspension is unique in that the springs are directly connected together

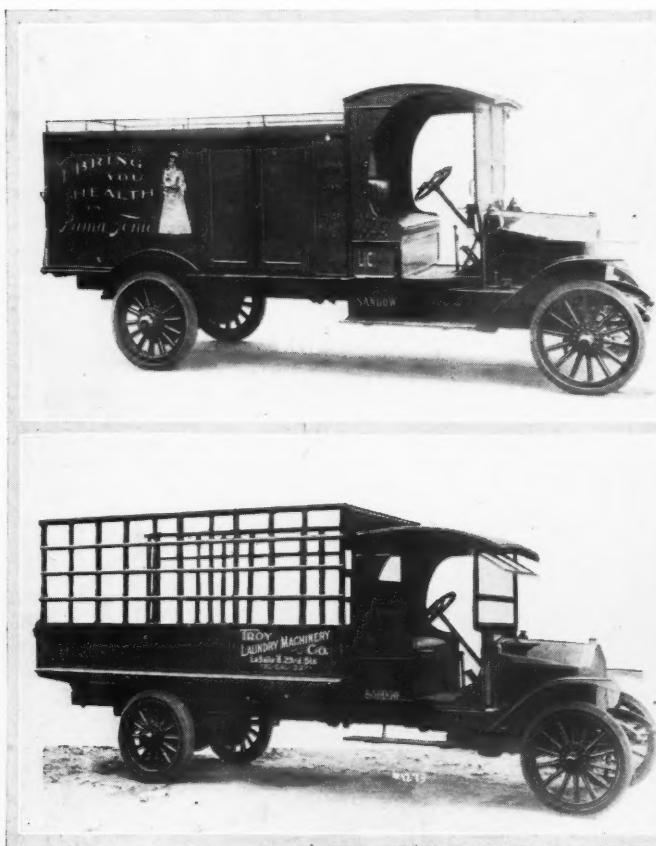
across the frame by means of a rigid steel cross member that is designed and proportioned to withstand the stresses caused by rough roads without undue strain to the frame or body. An exclusive feature is the Sandow power increaser. This device is said to increase the gasoline mileage, muffle without back pressure to the engine and eliminate the necessity of a cut-out. It is constructed in one piece and is very compact. The method of suspending the engine is also worthy of mention, as it enables the mechanic to remove the engine or

cover to the timing gears in a few minutes without disassembling the entire car. The simplicity of the arrangement permits removal of the entire power plant in approximately 45 minutes without disturbing the dash, body or steering gear. Another valuable feature is the radiator spring suspension which represents advanced ideas in radiator design and is intended to reduce leakage to the minimum. The radiator is sturdy in construction and is substantially mounted on shock-proof springs.



Republic Truck and Trailers Haul Five Thousand Bricks Per Trip

The truck illustrated above was sold by Green-Adler Company, Republic truck agents, of Daytona, Fla., to Gettes Long, of Daytona, last December. This truck is shown hauling 3000 Georgia brick, 1000 on the truck and 1000 on each trailer, weight of each brick 5½ lbs., or total of 16,500 lbs. on whole load. This truck delivered in one day, a total distance of five miles round trip from the railroad station, 18,000 bricks, making six trips, or a total of thirty miles. When Mr. Long bought this truck he had twelve mules, then he sold ten of them, and made trailers of his five wagons, and put ball bearings in the wheels. He is in the road-building business, and hauls mostly crushed shell. He uses his two mules as snatch teams, and takes the five wagons, one at a time, down into the pits to be loaded, and with the mules draws the wagons back to roadside, then hitches all five wagons to the truck and hauls the material to the job. He does not load the truck with anything but heavy tools, etc., when he hauls crushed shell.



Some Representative Specimens of the Sandow Models for 1917

These trucks are made in five capacities: one, one and a half, two, three and a half, and five ton. The units employed in manufacture are all of standard make, homogeneously assembled to form a thoroughly practical commercial car.

Plenty of the right kind of circulation means quantity results to advertisers in the CCJ

Study of Road Resistance

Tractive Resistances to a Motor Delivery Wagon on Different Roads and at Different Speeds*

By A. E. KENNELLY and O. R. SCHURIG

THE investigation herein described was carried on in the Research Division of the Electrical Engineering Department, at the Massachusetts Institute of Technology, under a fund contributed for researches on motor trucks. The object was to determine the resistance, including air resistance, offered to an electric truck, by level urban roads of different surface varieties, at standard truck speeds not exceeding 15.5 m.p.h. For this purpose, the output of the storage battery on a test truck was measured, for both directions of travel, over standard road beds, at different controller speeds. From this output were deducted all the corresponding electrical and mechanical losses in the truck mechanism, as determined by laboratory tests. The remainder of the output was consequently attributed to (1) road- (2) air- and (3) wind-resistance. The wind resistance was eliminated by averaging the results for both directions of running, leaving as the final result the sum of the road and air resistances.

By "road resistance" is meant the horizontal force required to pull the truck, assumed as internally frictionless, over the horizontal road, in the absence of air. By "air resistance" is meant the horizontal force on the truck required to overcome the resistance of the air, assumed as quiescent in the absence of the truck. By "wind resistance" is meant the horizontal force on the truck necessary to overcome the resistance of the wind velocity, or that velocity of the air with respect to the ground which exists in the absence of the truck.

The Test Truck

A 1000 lb. worm-drive, single-reduction electric truck, or delivery wagon, was placed at the disposal of the Research Division for the purposes of the test. Its specifications are as follow:

Load capacity 1000 lb. equipped with one d-c. series motor.

Overall length of frame 168½ in.

Width of frame 35 in.

Wheelbase (i. e., distance between centers of front and rear wheels, when front and rear axles are parallel) 107¾ in.

Wheel gage 58 in.

The total weight of the truck, including motor, battery and body, but without load or passengers, was 4200 lbs. Each of the four wheels was equipped with one solid rubber demountable tire rated at 36 in. by 2½ in., and actually measuring about 35 in.

*From Bulletin No. 10 of the Research Division of the Electrical Engineering Department of the Massachusetts Institute of Technology.

tread diameter, and 2½ in. width of base. The brakes were of the internal expanding type on each rear wheel.

The transmission system was of the shaft type, the speed reduction between motor and rear wheels (9:1) being accomplished by a single worm with worm wheel, i. e., the motor shaft is extended, through two universal joints, to the worm.

The electric motor is rated at 32 amp., 60 volt, 1200 r.p.m.

The controller is of the drum type, having four forward and two reverse speeds.

The battery consisted of 60 cells of the regular nickel-iron type, with a rated discharge capacity of 225 amp. hour. The normal charge and discharge rate is 45 amp., and the normal period of charge is seven hours at this rate. The average discharge voltage per cell is approximately 1.2 volts. The battery was placed in two compartments, one with 15 cells, another with 45 cells.

The entire battery with solution, trays and connections weighs approximately 1200 lbs.

Experimental Procedure

The tests made were of two kinds:

(1) Road tests, over selected measured lengths of road, at different measured truck speeds, to determine the gross battery output.

(2) Laboratory tests, to determine the overall efficiency between battery terminals and rear wheel treads, at speeds and loads corresponding to the road tests.

Road Tests. The resistance (excluding air-resistance) offered by a level roadbed to a moving truck, depends upon

(1) The surface quality; i. e., the smoothness, hardness and resilience of the road surface.

(2) The size of wheel and tire quality; i. e., the dimensions, smoothness, hardness and resilience of the tire tread.

(3) The speed of the vehicle.

(4) The load or weight of the vehicle.

(5) The construction of the vehicle; i. e., whether with or without springs.

In these tests variations in (2) and (5) were eliminated, by using the same vehicle and the same type and size of wheel and tire throughout, which fairly represent standard average conditions for half-ton truck service.

To investigate the effects of road surface quality on tractive resistance, stretches of nearly level typical urban roads were selected, with the aid of records in the Boston City Engineer's office. Runs were made with the truck over each selected stretch of road, at nearly constant speed by controller, and successively in both directions for each controller point, thus covering

the range of speeds afforded by the controller. The effect of load in the vehicle, upon the tractive resistance, was also tried in a few cases.

The technique of the tests was as follows: Previous to the first test of the day, the car storage battery was fully charged. The car crew consisted of one driver and two observers. The driver confined his attention to steering the car, while running at constant controller position. If the driver had to change the controller position, or apply the brakes, during the run, the run was repeated.

The first observer was stationed on the front seat, beside the driver, and noted the stop-watch times of start and finish, as well as the readings of the speedometers during the run.

The second observer was stationed in the body of the truck, and continuously took readings of voltage and current at battery terminals, by calibrated measuring instruments; these instruments being supported on cushions to minimize their vibration.

The start and finish for each stretch of road were marked off by chalk, or other clearly visible lines, drawn across the roadway. The car was always set in motion at a suitable distance behind the starting line, so as to reach approximately steady speed when this line was crossed. A stop-watch was started by the first observer at this moment. It was stopped by the same observer at the moment when the front wheels of the car crossed the finish line. The reading of the stop-watch was thus the time of the run.

The length of the run between start and finish lines was determined by means of a tape line. The runs varied in length from 400 to 2600 ft.

Wherever the grades of the test stretches were not obtained from the city maps, they were measured directly, on special days, by the car observers, with surveyors' level and rod, in the regular way.

For each controller speed, the car was run three times in each direction, over the test section, in immediate succession. By this method of running in alternate directions over the same section, the effect of wind on car resistance was approximately eliminated, on the assumption that if a wind was blowing it was uniform in velocity, and tended to exert a uniform pressure on the car, whether the latter was running with it or against it. No heavy windstorms occurred during the period selected for the tests. The arithmetical mean of the road resistances, as measured at nearly constant speeds in opposite directions, was assumed to eliminate the effects of wind velocity.

A further correction, namely that due to the change of kinetic energy imparted to

the vehicle, between start and finish, became necessary, because the speed was not absolutely constant during the run; i. e., a slight retardation or acceleration took place over the test stretch, in spite of the fact that the controller was not changed, that roads of uniform grade were selected, and also that the truck was started as far in advance of the mark as was practicable. The energy imparted to a truck which is accelerating includes not only that necessary to overcome its internal and external resistances, but also that definite amount of energy which is required to produce the acceleration. This energy was subtracted from the total energy imparted to the truck.

Laboratory Tests

To determine the truck-mechanism overall efficiency, from storage battery terminals to tire treads, as already referred to the car was taken into the Lowell laboratory, the rear wheels raised from the ground, and belted each to a load-generator. The motor was then operated through the controller, at a number of speeds, the power being delivered to the load-generators and measured over a considerable range of speeds and outputs.

The friction losses in the front wheels (about 70 watts total), were also measured by belting them to the rear wheels through light belts in special tests. No allowance was made for any possible increase in wheel-bearing friction under increased gravitational pressures; but since all the wheels had roller axle bearings, such extra friction losses were probably very small.

The sum of the load-generator outputs, the armature losses, and belt losses, was taken as the car output at rear-wheel treads at various measured inputs.

Results of Tests

Although the primary object of this research was a determination of tractive resistances to an electric truck, under the conditions previously defined, yet, incidentally, the tests have furnished results of practical value of the overall efficiency from battery terminals to wheel treads of this type of electric car, under normal operating conditions.

Efficiency tests were made at each controller position for forward speeds. In view of the relatively large voltage variation of the truck battery, between full charge and partial or complete discharge, and at different current outputs, it was found necessary to perform efficiency-test runs; (1) at a fully charged battery and (2) at a partially discharged battery, (1) corresponding to high impressed voltage and (2) to a slightly lower impressed voltage.

The efficiency of transmission between motor and rear wheel treads is in the neighborhood of 90 per cent. for this truck under the conditions tested. This high value may be attributed to the fact that the driving mechanism involves but a single speed reduction, between motor and rear axle, by a worm and worm wheel. The maximum values of overall efficiency, including all mechanical and electrical losses beyond the battery terminals are

as follows, when an approximately fully charged battery is employed:

55 per cent., controller on point 1, forward at a battery output of 2000 watts.

73 per cent., controller on point 2, forward at a battery output of 3000 watts.

75 per cent., controller on point 3, forward at a battery output of 3500 watts.

78 per cent., controller on point 4, forward at a battery output of 3700 watts.

Test on Various Kinds of Roads

Tests of tractive resistance were made upon two kinds of asphalt roads, sheet asphalt (a) and bitulithic pavements (b), both defined as follows: (a) asphalt, consisting of (1) a foundation of hydraulic cement or concrete, (2) a binder course of broken stone and asphaltic cement (dissolved asphalt), (3) a surface layer of asphaltic cement mixed with sand; (b) bitulithic pavement, which may be classified as a type of asphalt-macadam pavement, built on a concrete, stone-block or macadam foundation, consisting of a mixture of broken stone, sand and asphaltic cement, proportioned and mixed before being laid. This mixture, after having been laid hot, and rolled, is covered with a coat of hot asphaltic cement and fine stone chips.

The tests showed that there was no appreciable difference between the tractive resistances of sheet asphalt and bitulithic pavements as above defined when in good condition. The asphalt pavement, when in good condition, offers a low resistance to vehicular traffic, on account of its smoothness and hardness.

The wood-block paving tested consisted of rectangular creosoted hard pine blocks, approximately 4 in. deep, 3.5 in. wide and 8 in. long, placed, with the fibre vertical, and the long dimension crosswise to the street, upon a foundation of concrete with a thin layer of sand interposed between concrete and wood blocks. The tractive resistance is higher than for asphalt, but like the latter does not increase rapidly with increase of speed because of the smoothness of the pavement.

The brick-block roads upon which tests were made, consisted of rectangular vitrified paving brick, approximately 4 in. deep, 3.5 in. wide, and 8.5 in. long, laid with the length perpendicular to the curb, upon a foundation of concrete and a cushion layer of sand. The results for brick roads show nearly as low a resistance as those for the wood block.

The foundation for granite-block roads is either a bed of sand or a layer of concrete, with a sand cushion to separate the blocks from the concrete. Average dimensions for the rectangular blocks are about 4 in. wide, 11 in. long and 8 in. deep. The joints are filled either with small pebbles and sand, or with hydraulic-cement grout. The former filler is subject to being partially washed out by precipitation, and removed by the street sweeper, and thus allows the edges of the blocks to be exposed to wear, which renders the pavement far less smooth than one with cement-filled joints. Granite-block roads, with cement-filled joints, show a greater increase of resistance with speed than the smoother brick-

block, wood-block and asphalt roads, already mentioned; while the granite-block pavements constructed with the less durable filler are seen to offer a still more rapidly increasing resistance at increasing velocities, because of the greater losses of kinetic energy due to road impact.

Macadam roads have a pavement consisting of several layers of broken stone (trap rock, granite, limestone, slate, etc.), ranging in size from about 3 in. to about 0.5 in. in largest dimension. The fragments of stone are held together by a binding material, of which there are two general types: (1) clay, loam, sand or finest screenings (stone dust from stone crusher), distributed over each layer of broken stone, water being sprinkled over the surface; and (2) tar, either mixed with the broken stone before it is laid, or distributed over the broken stone, after the latter has been spread and rolled; type (1) is known as a water-bound macadam, and type (2) as tar-macadam.

A dusty road has a greater resistance than a similar one with a hard surface without dust; while a badly worn road with holes shows a far higher resistance, and a much more rapid rise with increasing speed, due to impact losses. An oiled macadam road, though in fair condition, shows a higher resistance than a similar road unoled. Heavy oiling increases the resistance, probably caused by the softening of the surface and the resultant loss of power due to the depression of the surface material by the wheel tires.

The results for tar-macadam roads are similar to those for water-bonded macadam. The resistance of a soft surface of low resilience is greater than that of a similar but hard road by an approximately constant amount.

A cinder road with a dry and hard surface in fair condition has a slightly lower resistance than a road with a gravel surface, in fair condition, but slightly dusty, probably because of its greater resilience.

Summary for All Classes of Urban Roads Tested

Typical results for all classes of urban roads tested are summarized in the accompanying table. It appears there are three principal elements that determine the ratio of tractive resistance to speed for unit weight of a given vehicle, within the range of conditions covered by this test:

(1) A constant resistance, the magnitude of which depends on the lack of resilience of the road surface and wheel tire material, i. e., on the energy losses due to displacement of tire material and road surface material. This constant element would be encountered upon a smooth level road of the particular type considered, in the absence of impact, air and wind resistances.

(2) An increasing resistance with increasing speed, due to impact losses, which results from lack of smoothness of road surface; losses of this nature are usually known to vary approximately as the second power of the velocity at impact; and

(3) An increasing resistance with in-

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creased speed, due to air pressure against the front of the vehicle, which resistance is known to depend, roughly, on the second power of the speed.

SUMMARY OF TRACTIVE RESISTANCES OF DIFFERENT URBAN ROADS AT DIFFERENT SPEEDS

All Tractive Resistances Are Expressed in Equivalent Per Cent Grade

Type	Road Condition	Equivalent per cent. grade		Per cent. increase in tractive resistance from 10 to 12.4 m.p.h.	Comparative tractive resistance factors referred to asphalt roads, at	
		at 10 m.p.h.	at 12.4 m.p.h.		10 m.p.h.	12.4 m.p.h.
Asphalt	good	0.93	0.97	4	1.0	1.0
Asphalt	poor	1.03	1.16	11	1.11	1.20
Wood block	good	1.10	1.15	5	1.18	1.18
Brick block	good	1.12	1.21	8	1.20	1.25
Brick block	slightly worn	1.14	1.27	11	1.23	1.31
Granite block	good	1.83	2.16	18	1.97	2.23
Granite block with cement joints	good	1.16	1.37	18	1.25	1.41
Macadam, water bonded.	dry and hard	1.06	1.17	10	1.14	1.20
Macadam, water bonded.	fair, heavily oiled	1.63	1.76	8	1.75	1.82
Macadam, water bonded.	poor, damp					
	some holes	1.65	1.89	15	1.78	1.95
Tar macadam	good	1.17	1.27	9	1.26	1.31
Tar macadam	very soft	1.67	1.76	5	1.80	1.81
Tar macadam	many holes, extremely poor, soft	2.38	2.75	16	2.55	2.85
Cinder	fair, hard	1.25	1.39	11	1.35	1.43
Gravel	fair, dusty	1.37	1.50	9	1.47	1.55

The constant resistance (1) may be briefly called the displacement resistance, item 2 the impact resistance, and item 3 the air resistance. The displacement resistance is low for hard pavements, and high for soft pavements (of low resilience). The impact resistance is very marked in granite-block roads. The air resistance, at any definite velocity, is the same for all curves; because the air-resisting parts of the truck were left unchanged throughout the tests. An asphalt road in poor condition, at a speed of 12.4 m.p.h., the displacement resistance is 0.84 per cent., the air resistance is 0.11 per cent., the impact resistance 0.20 per cent. and the total 1.15 per cent. equivalent grade.

The displacement resistance of a road manifestly varies, not only with the type and surface quality of the road, but also with the type, dimensions and quality of the tires on the wheels of the vehicle. In the tests here reported, the same tires were used throughout, and they remained in substantially the same condition.

The impact resistance of a road manifestly depends not only on the type and surface quality of the road, and the sizes of its irregularities, but also on the type, dimensions and quality of the wheel tires, the weight of the truck, and the quality of its springs.

The air resistance per unit weight of truck manifestly depends upon the weight, dimensions and shape of the vehicle, as well as on the speed of the vehicle relatively to the surrounding air.

The wind resistance per unit weight of truck manifestly depends upon the weight, dimensions and shape of the vehicle, as well as on the direction and velocity of the wind and the velocity of the vehicle. It is assumed that at low wind and vehicle speeds, like those here considered, only that component of the wind which is in the

direction of the vehicle's path needs to be taken into account, and that the mean of the wind resistances in opposite directions, along the road, is zero.

Summary of Conclusions

The following conclusions are indicated from the preceding results: as confined to urban roads, with a solid rubber tired motor truck between the speed limits of from 8 to 15.5 m.p.h.

(1) The overall efficiency of the test-truck mechanism between battery terminals and rear wheel treads, reached a maximum value of about 78 per cent., under the most favorable conditions.

(2) The mechanical efficiency of transmission from motor shaft to rear wheel treads, for the truck tested, shaft-driven through a single reduction worm gear, was found as high as 90 per cent.

(3) Tractive resistances are most conveniently expressed as an equivalent percentage grade; i. e., a level road of definite tractive resistance may be regarded as a road of zero tractive resistance, but rising uniformly x units in 100 units of road length, or having an equivalent grade of x per cent.

(4) Under the conditions of these tests, the tractive resistance on level roads, in the absence of wind, is composed of (a) displacement resistance, (b) impact resistance, and (c) air resistance.

(5) The displacement resistance varied from 0.85 per cent. equivalent grade, for a hard, smooth asphalt or bituminous concrete, to 1.6 per cent. for a very soft, tar-macadam road, and was practically constant, for all speeds considered, on any given road.

(6) The impact resistance increases with the velocity, with the total weight of vehicle, and with increasing road surface roughness. In these tests, the impact re-

sistance of good asphalt or bitulithic or other smooth pavement was practically negligible, and reached its highest values on granite-block roads with sand filled joints, and on badly worn macadam pavements. The rate of increase of impact resistance with speed was most marked on the roughest roads.

(7) At the vehicle speed of 12.4 m.p.h., the air resistance for the vehicle tested, assumed to be dependent only on the speed, was roughly 0.11 per cent. equivalent grade; i. e., from 4 per cent. of the highest to 12.5 per cent. of the lowest, total tractive resistance.

(8) The following urban pavements are enumerated in the order of their desirability for vehicle operation from the point of view of tractive resistance at 12.4 m.p.h., as found in this investigation: Asphalt, wood-block, hard smooth macadam, brick-block, granite-block with cement-filled joints, cinder, gravel, granite-block with sand-filled joints.

(9) The equivalent grade at 12.4 m.p.h. of a badly worn city macadam road was found to be nearly three times as great as that of the best asphalt road tested. This means, at this speed, a consumption of energy at wheel treads of nearly three times as much on level poor macadam roads as on good level asphalt roads.

(10) Increasing the gross weight of the vehicle by 12 per cent., through load, was found to have no effect on tractive resistance within the observed speed limits for smooth roads in good condition; but on rough roads, a distinct increase in tractive resistance with this extra weight was observed.

(11) The presence of a layer of dust, say, $\frac{3}{8}$ in. thick, on a fair macadam road, was found to increase the equivalent grade of tractive resistance, at all tested speeds, by about 0.15 per cent.

(12) A freshly tarred and therefore very soft tar-macadam road was found to have an increased tractive resistance equivalent, at substantially all tested speeds, of about 0.5 per cent. The tires in this case sank about 0.8 in. into the road bed, the gross car weight being 4710 lbs.

(13) The total range of tractive resistance equivalent grade covered in the tests, was from 0.93 per cent. on the best asphalt road, at lowest speed, to 2.7 per cent. on the worst macadam road, at nearly the highest speed.

PULLMAN MOTOR CAR Co., York, Pa., recently organized its official staff as follows:

The office of general manager, formerly occupied by H. W. Hayden, has been abolished and in its stead all departments will report to the operating board consisting of Messrs. Keyworth, Hoff and Schmidt.

Sales, advertising and purchases will be under the direction of A. R. Cosgrove, assisted by R. E. Trout, E. W. VanDuzen and H. C. Curtis. H. P. Jones will have charge of finance and accounting. Service, stock and field service will be under S. L. Fuller, and cost accounting under G. Ed. Schwartz.

Chas. G. Schwartz will have charge of factory production, Mr. Delabar the office management.

Why is the CCJ the only truck paper a member of the Audit Bureau of Circulations? Here's food for thought

The "Fast Mail" Carbureter

Uncle Sam's right of way over all traffic expedites mail delivery only when postal trucks are equipped with a dependable carbureter. New York City's Post Office is served by Republic Trucks, Master equipped. Read:

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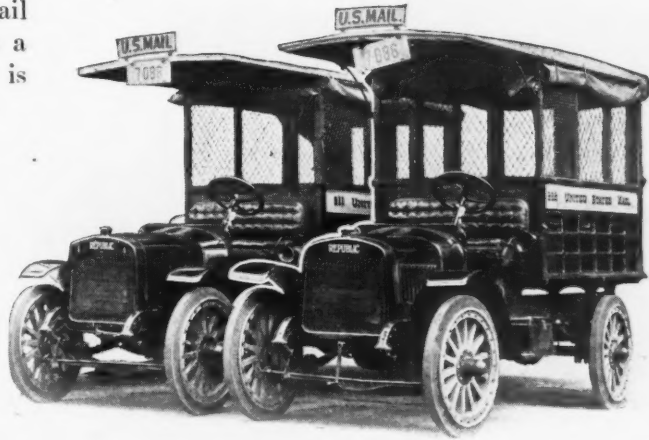
Master Carbureter Corporation,
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Gentlemen:

Enclosed please find our order for ten of the 1 1/4" Junior MASTER CARBURETERS, with full hot-air attachments complete. We desire to have these installed on ten new Republic cars just purchased.

We are anxious to get these on right away, as it means a considerable saving in gasoline to us. We ran one of these carbureters for several months on one of the Republic cars and found that our gasoline saving was in the neighborhood of 30 per cent. After installing the MASTER, we found that our consumption of gasoline dropped from about 11 1/2 gallons to 7 and 7 1/2 gallons, on a 77 mile schedule.

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More Mileage

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YOU TAKE NO RISK—more mileage and more power are guaranteed to you. One of our 200 dealers is right near you, determined to see to it that the Master gives you the same perfect satisfaction that it is giving to thousands of owners of power trucks of every make and size. Install a Master on your old truck, specify it for your new one and hold us responsible for results. Your money back if it fails to give you 25 to 40% more mileage with greater power and with none of the troublesome adjustments required by automatic carbureters.

The Carbureter That is DIFFERENT

Compare the Master with other carbureters. Note the absence of all springs, cams, dashpots, auxiliary valves and compensating devices. The Master is the scientific solution of carburetion. An investigation of its principle will convince you—a demonstration on your truck will prove it to you.

In the interest of more efficient and economical truck service, it will pay you to learn about the wonderful advantages of the MASTER:

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| Perfect Mixture—14 Jets instead of 1 to 3 | Quick Starting |
| No Adjustments | Flexibility |
| Simplicity of Construction | Trouble-proof Operation |
| Steering-Post Lever | Vaporization of Low-Grade Fuels |
| Positive Mechanical Control instead of Variable Automatic Operation | 25 to 40% MORE MILEAGE |
| | 30% MORE POWER |

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SOME SMALL TRUCK EXPERIENCES

By HERMAN UFER

VERY many small merchants in Chicago, such as grocerymen, expressmen, etc., are now using in place of one-horse delivery wagons, 1-ton trucks of various makes, or touring car chassis with delivery bodies. Some of these are of special design, so as to be more conspicuous from an advertising standpoint, and some are made up so as to conform to their individual needs for carrying their merchandise, but most of them are the ordinary type of delivery body. That they are making good and proving to be more useful and economical than the horse that they are gradually displacing is true in most cases beyond a doubt.

M. J. Brierty, 716 North Clark Street, is in the grocery and meat business, and is using a Ford touring car with the ordinary type of delivery body attached. Referring to his experience, he said, "Why I used to have 6 horses and wagons and they did not do my work as well and quickly as that little truck is doing it, and I have had it only 5 months now. I often run short of groceries or meats unexpectedly, or have to make a quick delivery of goods to some family or restaurant up in Evanston, which is 15 miles away. To get my supplies down at South Water Street, with a horse, took about 2 hours. Now the driver is hardly gone before I see him back again, and, to deliver something in Evanston, why he used to be gone so long with the horse that I forgot what he looked like. With the truck he is seldom away more than 2 or 2½ hours, and I am doing more business and am able to take in a larger radius than ever before, and it has only cost me \$10 for repairs on the car in the 5 months that I have had it. The biggest expense is the tires, from glass and rocks cutting the outer casings. Pay, yes, that truck more than pays."

Mr. Anderson, of 126 West Chicago Avenue, is another recent convert, having used a horse and wagon for many years in his express and moving business, but for the past four months has been using a Ford truck instead. He keeps his truck in the same barn that formerly housed his horses, and the same man drives his truck that drove

the horses. He finds it easier and quicker to pick up his light deliveries and his truck is proving to be very profitable to him, as he can now do more work than with a horse, and the radius of his work is gradually extending. His expense for the mechanical end so far has been nothing, but he has had some trouble with cuts on his outer casings, as the nature of his work makes it necessary to go into all kinds of poorly-paved streets and alleys. For this reason he thinks that the rear wheels should have solid tires, as they are the ones that suffer the most.

Those in the laundry business are also experiencing the economy of the commercial car in their delivering and collecting. Here one small truck supplants from 3 to 4 one-horse wagons on account of the greater speed that can be made between stops, and further, can and does cover larger territories than was possible when limited by the endurance of the horse. The results are better in all seasons of the year, and the length of time per day that the

truck is operated depends only on the delivery man's ability to last. The same men here, too, are driving the trucks that drove the horses. In this line, particularly, since the driver is also the deliveryman and must keep his hands clean, self-starters should be provided on the cars. On account of the frequent stops the generators should have the charging rate "boosted" up some, as otherwise the batteries would not keep up to capacity. Then the driver not only does not get his hands dirty cranking the engine at each stop, but he saves his energy for other purposes.

ELECTRIC STORAGE BATTERY Co. and the Exide Battery Depots, Inc., of Philadelphia, have opened offices at 3-5 N. 15th Street, Minneapolis, Minn. In Chicago, in addition to the Exide Battery Depot at 333 W. 35th Street, the Exide Battery Depots, Inc., has opened a service station at 18-24 E. 25th Street, which will be devoted to electric vehicle and automobile starting and lighting battery work.

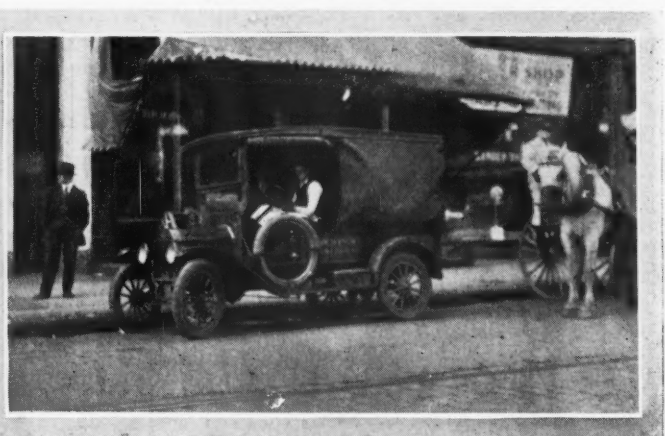


One of the Trucks Which Supply Southern California With Gasoline

This illustration shows one of the fleet of Federal trucks, made by the Federal Motor Truck Company, Detroit, Mich., used by the Home Oil Company, to supply its oil stations with lubricating oil, gasoline and solid greases. These trucks cover nearly all of Southern California. Of particular interest is the novel tank equipment from which the contents are unloaded by special pump equipment shown suspended by the side of the frame by brackets. This pumping apparatus was designed by the company's engineer and is operated from the flywheel of the engine by a friction wheel made of paper composition, and a rotary pump driven by chain from the shaft attached to this wheel. A truck so equipped can dispense with a load of 420 gallons from the drum in 14 minutes, approximately one-third of the time required to pump it by hand. The office of the Home Oil Company is located at Redlands, Cal.



A Successor to the Horse in Express Work and Light Trucking, Doing Faster Work and Over Greater Radius



Grocery and Meat Delivery That is Doing More for Its Owner Than Six Horses and Wagons

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The truth is that the pleasure car business is down to hardpan right now. 75% of pleasure car dealers are not making money. Many are losing money.

Now, consider the power truck as a field for future business. The horse is passing. Even a peddler knows that the horse is an extravagance. In three years every intelligent merchant and manufacturer will be operating trucks. That will mean millions of sales. Today there are about 160,000 trucks in use, and only 8,000 truck dealers. (Remember there are 35,000 pleasure car dealers).

You pleasure car dealers have exactly the opportunity to get in on the ground floor in the power truck industry that was seized upon by the most far-sighted of you some dozen years ago in your own field with such notable success.

This is the reason:

60% of power trucks are sold today direct by their manufacturers. Do you want that to continue? Some dealers wonder if their salesmen can sell trucks. Of course, they can. Ask any *Koehler* agent. Hundreds of pleasure car dealers are winning big success with the *Koehler*. A man who knows enough about mechanics to sell pleasure cars can sell trucks. What difference does it make whether an express body or limousine body is mounted on the chassis? The mechanism is the same in principle. A power truck is nothing but an express wagon with a motor instead of horses. Merchants already know they want power trucks. A mere order taker could sell them. A live wire can get rich selling them.

Now for the *Koehler* one-ton truck.

From stem to stern the *Koehler* is built for trucking. It's not a converted pleasure car. It's as rugged as a mule, as tireless as an ox and has the brutal power of 34 percherons.

A better truck couldn't be made at any price. And it's the lowest priced one-ton truck of proved reliability on the market.

Any merchant in your territory can afford it and can halve delivery costs by operating it.

And additional plans are under way for backing up agents with startling efficiency.

Looked at from every angle, the *Koehler* is the most promising proposition, from a dealer's standpoint, you can find. It will take over half your pleasure car overhead expense in addition to its own. It will insure the future of your business.

Write for details.

Overhead Valves Internal-Gear Drive

Brief Specifications:

Motor— $3\frac{1}{2} \times 5$, 35 H. P., four cylinders, cast en bloc. **Overhead Valves**—Long stroke. Crankshaft extra large on **three bearings**, of 2" diameter. **Ignition**—high-tension magneto. **Radiator**—cast finhead, built-up type, same as on highest priced trucks. **Wheelbase**—129". **Transmission**—Three speed selective sliding gear, annular ball bearings. **Drive**—Through tubular shaft and double universal joints. **Tires**—solid—34 x 3 front, 34 x $3\frac{1}{2}$ rear. **Internal-Gear Drive Rear Axle**—All gears chrome nickel steel, roller bearings throughout. Vanadium steel spindles. **Front Axle**—I-beam, drop-forged; 2-inch spindles. **Colors**—Black, and Light Orange. **Fenders**—Front and rear (rear with body only). **Lazy-Back**—on driver's seat. Express Type Body, when purchased with chassis,—\$40 extra. Top—\$45 extra. Chassis \$895 complete. Prices F. O. B. Newark, N. J.

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Newark, N. J.

ONE
TON TRUCK
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Instructions for Drivers

"Breaking in" a New Driver; Common Causes of Trouble; Daily Routine; Starting the Engine; Cold-Weather Hints

Compiled by E. S. FOLJAMBE

This course, as originally published in pamphlet form, has been in such demand that it has been decided to reprint it in these pages and it will appear in successive issues until completed. It is intended to call the attention of both the owner and driver to the importance of properly handling the truck on the road and in the garage, but is not intended in any way as a course of instruction on commercial car mechanism. It contains brief, but pertinent, general instructions as to the best methods of starting the engine, stopping, oiling (with diagrams), washing, etc.; together with rules of the road (with diagrams), don'ts for the truck driver, forms for keeping performance and expense records, a complete list of the names of truck parts, and a comprehensive section devoted to troubles and how to locate them.—Editor

PART I

THIS brief course is intended as an aid not only to the drivers, but commercial car users in general. It has been said that fully 90 per cent. of motor truck troubles are due to the carelessness of the drivers. Whether this is true or not it is certain that many troubles arise, due either to lack of attention on the part of the operators or because they are not sufficiently familiar with the details to realize when immediate attention is required, to avoid trouble.

Economical service from any motor truck depends upon systematic care, proper handling, capacity loads and minimum loading time.

The life of tires, chains, sprockets, springs, bearings, etc., is not a question of age, but of mileage, and the frequency with which stops and starts are made.

"Mileage,"—not "time in service," should determine the overhauling period. This general going over should be given the truck whether the machine shows externally that it needs such attention or not.

It is not economical to use worn-out parts or run with parts out of adjustment. The time or money outlay required to remedy these troubles will always be well repaid by longer life and better service from the vehicle.

Trucks are now so perfected in details of construction, so well made, of such good material and so thoroughly tried before they are placed in the hands of the user, that a decided failure of any standard truck in service can usually be traced to its method of handling. There are several very prevalent abuses, namely, overloading and overspeeding. Whenever possible one competent man should have charge of all vehicles and be responsible for their performance. In any case, machines should be fitted with a recording instrument which will keep a record of performance, prevent overspeeding and ensure efficient service.

How to "Break in" a Truck Driver

The "breaking in" of a new driver on a motor truck is very important. On this man depends to a great extent the success of the truck. Through him it can be run one year or five years, granting, of course, that the machine is a first-class one. It

might be said here, for the benefit of buyers of motor trucks, that when a heavy commercial car is offered at a low figure, beware. To get the goods one must pay the price and in the long run it will pay to do it. So if you have a cheap, big truck don't expect your driver to keep it running like a high priced one. He cannot do it.

Most motor truck buyers are at present using horses and disposing of them as the trucks are bought. The first question one thinks of is whether to put the teamster on the truck or not. If the man has served you faithfully, and has a fair amount of intelligence, by all means give him a trial, and nine out of ten times he will prove a success. He has the advantage of knowing nothing about trucks, but is willing to be taught, which is very important. This kind of a man will follow instructions more carefully than will the hired chauffeur, and will take more pride in his truck. A chauffeur cannot be taught anything, for he feels experienced, and in few cases is.

To break in a teamster on a truck, take him to the outer edge of the city, and as soon as you get away from the traffic let him drive a while, to get accustomed to the manipulating of the wheel. Then stop and carefully explain the clutch action, and why there are several gear shifts, using plain, simple words. Among the first things is to impress strongly on his mind how to stop quickly. Then the man sits behind the wheel and tries starting and stopping. Do this at least a dozen times. By night he has become pretty familiar with the actual driving. The next day show him how to crank the engine. See that the oil in the crankcase is up to level, turn up all grease cups, look in the radiator and gasoline tank. Then get the instruction book and read over every word aloud, explaining each diagram or picture. Examine the tool box and show him what use each tool has. The rest of the day he drives, but now, of course, the truck is in service.

The third day again read the instruction book, and also each day that an instructor is along. Do this many times. The third morning the man turns up the grease cups, giving each one a complete turn and repeats to the instructor the principal instruction of the first few days.

The fourth day is a repetition of the third with a few new points added, such as cleaning the spark plugs and carburetor.

washing out the clutch, taking up chains, detecting explosion misses, tightening steering post, flushing out the water system, taking up brakes, tightening all nuts, spring clips, etc. Of course, care must be taken not to crowd the man too fast, but at the same time teach him all you possibly can that may be useful to him.

The fifth day everything previously studied is gone over; in this way, and only this way, can so much be impressed on the man's mind. If he is not very quick at grasping things, they must be drilled in.

This day we may take off a wheel and inspect its bearings, remove a chain, look in the transmission and differential. Then explain their actions and their proper oil levels.

The sixth day is again a review of the other five. He asks for information on any point not previously covered or one he may not have understood.

On the seventh and last day have him change oil throughout the car and refill, to make sure he understands the amounts and kinds. He repacks all grease cups, tightens and greases chains, and, in fact, actually performs every operation touched on during the week. Then test him by slyly disconnecting a spark plug terminal and let him detect and find the miss, or change the carburetor adjustment to see if he will notice it. In fact, this day he gives it the same roundhouse attention that he should give it every thousand miles. This roundhouse work is absolutely necessary; just as the locomotive, running on rails, receives it after every trip, so must the truck receive a certain amount every day, and a good looking over every thousand miles.

We now have the beginning of a good driver, who thoroughly understands the care of the truck. It is now up to the owner to see that he does it. Of course, he will not have everything clearly in mind, but when troubles come, he will recall these things and this drill will then be very useful to him. It is most important to impress on him the value of a little work every day, a good job every two weeks or thousand miles. To the owner this means reduced expenses and two years added to the life of the truck. To the driver it usually means an increase in wages, for the average owner appreciates this care of his equipment.

That Ford Truck



will give you

**10% to 30% More Power
on 25% to 50% Less Gasoline
and 50% to 75% Less Oil**

if you install a set of twelve

AMERICAN HAMMERED PISTON RINGS *They're Leak-Tight*

Not only do we guarantee these results but we further guarantee the elimination of Carbon and Spark Plug Trouble and Smoking. Our Guarantee has no string attached to it. If, within one year after you install a set of AMERICAN HAMMERED PISTON RINGS, you are not satisfied with results, send them back to us and we'll refund your money.

**The cost of a set of twelve
AMERICAN HAMMERED PISTON RINGS
for your Ford Truck is \$7.50**

If you can't buy them from your garage or repairman or accessory dealer, send your \$7.50 to us—check, postal or express money order will do—and we'll send you a set from our factory.

AMERICAN HAMMERED PISTON RINGS are easy to install and they'll pay for themselves quickly in savings on gas and oil. We warn all Ford Car owners not to use Piston Rings made of more than one piece. If you want to know why, write us.

AMERICAN HAMMERED PISTON RINGS are considered by leading automobile manufacturers the most serviceable piston rings ever made. You'll find these rings used exclusively by Pierce-Arrow, Chalmers, Winton, Mercer, Stearns, Lozier, White, International, Kelly-Springfield. They're a *necessity*, not a *luxury*.

We Want Agents and Dealers

To enterprising men we will give exclusive rights to the sale of AMERICAN HAMMERED PISTON RINGS in desirable territory. Write for Complete Particulars.

On request we will send to anyone interested in automobiles and trucks our instructive Booklets—"The Soul of the Motor" and the "Story of the Magic Ring."

AMERICAN PISTON RING COMPANY
DEPARTMENT C NEWARK, NEW JERSEY

Common Causes of Trouble

Overloading.
Overspeeding.
Careless driving.
Inadequate lubrication.
Poor quality of lubricants.
Lack of cleanliness.
Dirty spark plugs.
Carbon deposits in cylinders.
Exhausted batteries.
Loose or broken wires.
Imperfect adjustment of brakes, bearings, etc.
Dirty gasoline.
Water in the gasoline.
Lack of water circulation.
Frozen circulating water.

Of these troubles overloading usually ranks first, overspeeding second, careless driving third, and lack of lubrication fourth. Any one of these will put a truck out of commission very rapidly if continued.

Lack of lubrication, as is well understood by all drivers, is likely to ruin the most important and vital parts, necessitating either a complete overhauling or renewal of the parts or the purchase of a new truck. If the engine is run after its bearings have been destroyed by lack of proper lubrication, the truck must be laid up and a large bill of expense incurred. More on the subject of lubrication will be given in a later installment.

Daily Routine

Before starting from the garage in the morning make sure that your gasoline tank is filled, that the radiator is full, and that all parts are properly lubricated according to the list supplied by the makers. The speed lever should be in neutral position and the brake set. Place the spark lever toward retard so that the engine will not kick, adjust the throttle lever to the point at which the engine starts best, which is

usually about 1-5 to $\frac{1}{4}$ up on the arc or quadrant. If the engine is cold and does not start readily it may be necessary to flood the carburetor or prime through the pet cocks, as will be explained shortly.

Glance at the brake bands to see that they are not dragging, and at the tires to note their condition. (The care and adjustment of brakes will be treated more fully in another section of this series.) It is also a good idea to give the wheels a shake to see if there is any looseness. Inspect the steering gear and its connections and see that nothing is loose.

Starting the Engine

After assuring yourself that the spark and throttle are properly set, grasp the starting handle with the right hand, being careful that the thumb is underneath, and with the left hand push the starting crank in against the spring which holds it out of engagement and pull the crank up sharply in a clockwise direction.

Do not push down on the starting crank with the switch on, as you may be injured by a back kick.

For a beginner it is often well to spin the engine two or three times with the switch off, then throw on the switch and crank again; the cylinders being full of gas the engine should start immediately.

If the engine has recently stopped and is still warm, it may start on the spark if dual spark in a retarded position, throwing on button on the switch, or by placing the spark in a retarded position, throwing on the switch and swinging the spark lever rapidly over the arc and as quickly back to a position at which the engine will run. As soon as the engine is running switch over on the magneto to save the battery.

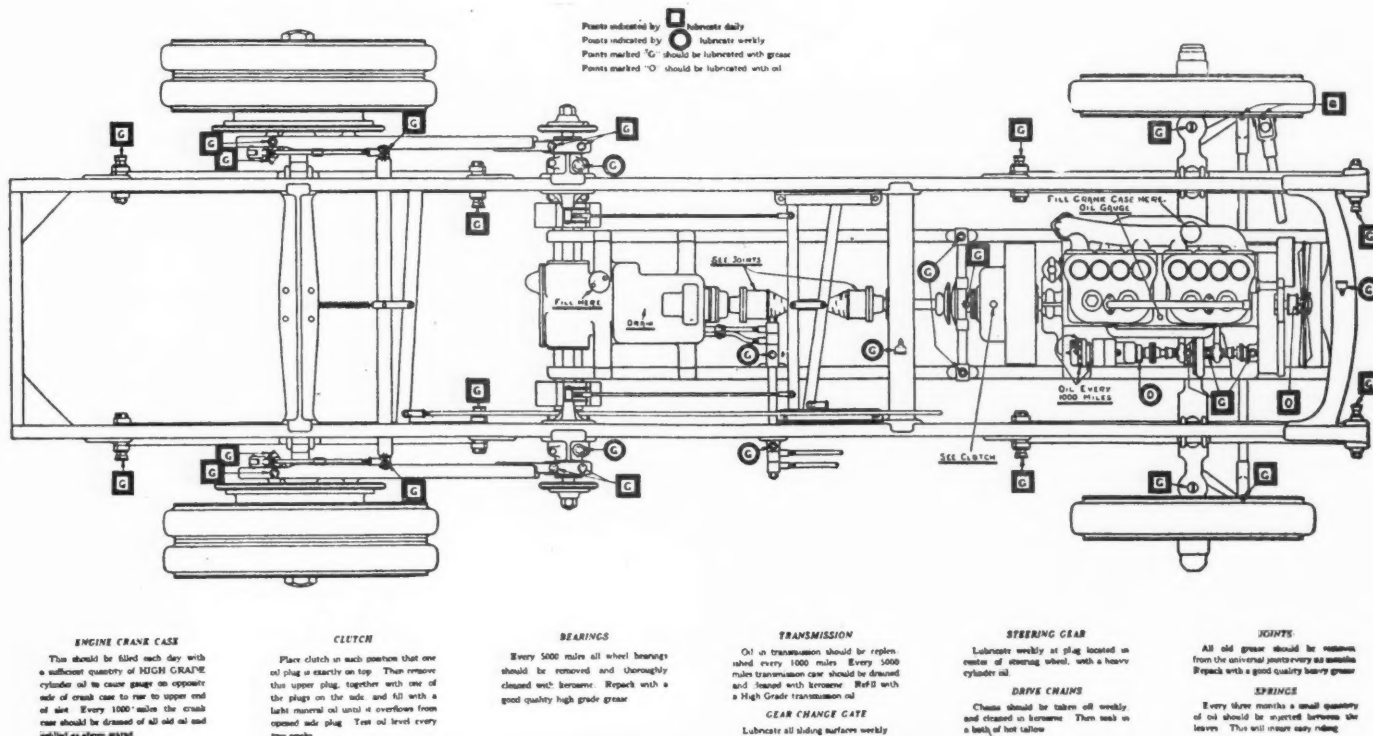
What to Do in Cold Weather

If the garage is not heated in severe winter weather it is necessary to drain the

water from the circulating system, unless an anti-freezing mixture is used. Care should be taken to see that all the water is drained out, as air pockets sometimes form, which keep the passages from entirely emptying. Running the engine a little, or bouncing the car up and down by standing on the step, will start the interrupted flow. A blanket thrown over the radiator while still warm will often prevent freezing.

In very cold weather or if the engine has stood until the cylinders are thoroughly chilled, it may be necessary to prime the engine with gasoline; this consists simply in putting a little gasoline (a few squirts from an oil can filled with gasoline) into the cylinder. This can be done through the little priming cups, if provided, or by special priming devices, if there are any on the truck, or by removing the spark plugs and squirting the gasoline directly into the cylinders. If there are no priming cups or other means, crank the engine in the usual manner. In extreme cases it may be necessary to wrap rags, saturated with hot water, around the carburetor or the pipe leading to it, care being taken that no water gets into the carburetor. It may even be necessary to remove the screw caps from the cylinders, place them on a cement floor or a stone, pour the wrench hole full of gasoline and burn same, heating the caps, then screw them back into position and crank. The hot caps vaporize the gasoline and the engine starts. Replacing the cold water in the radiator by hot water also helps.

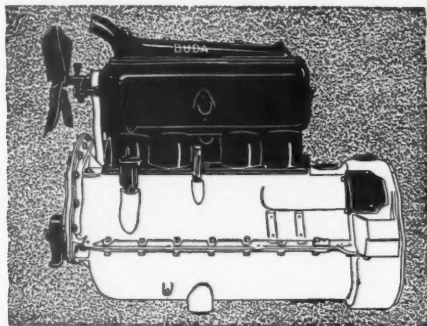
There are three principal agents used as the basis for anti-freezing solutions in the cooling systems of water-cooled automobile engines—calcium chloride, glycerine and alcohol. Denatured alcohol does not damage the metal of the water-jackets, radiator or connections, and has no fault except that it evaporates. The other solutions each have special advantages, and drivers may



Lubrication Diagram Put Out by a Well-Known Truck Maker

The CHILTON ideal—honest circulation; results to advertisers—fully exemplified in the CCJ

"LET US HAVE THE FACTS"—No. 1



VOLUMETRIC EFFICIENCY

if theoretically perfect would mean filling the cylinders 100 per cent full of fresh gas on each cycle. This target is too high to hit, of course, but the BUDA MOTOR comes exceptionally near it.

The BUDA MOTOR

has its high Volumetric Efficiency assured:

1. By surrounding the intake manifold with a hot water jacket.
2. By providing an intake manifold free from sharp bends, and smooth inside.
3. By designing and locating the valve pockets so as to offer the very least resistance to the flow of gas during both intake and exhaust strokes.
4. By using the utmost care to provide the precisely correct relation between opening and closing of intake and exhaust valves.

The BUDA MOTORS for cars, trucks and tractors bear the closest technical examination. Try it.

THE BUDA COMPANY, HARVEY (Chicago Suburb), ILL.



consult their own preferences as to which agency they prefer.

Calcium chloride (CaCl_2) is a very effective anti-freezing agent, but unless the chemically pure article is used there is danger of corrosion of the metal with which it comes in contact. A solution of 5 lbs. of calcium chloride to each gal. of water will not freeze at any temperature above 35 deg. Fahr. above zero. A more convenient way to prepare the solution is to first make a "saturated solution" of the calcium chloride and water, that is, mix with a quantity of water warmed to 60 deg. Fahr. all the calcium chloride the water will completely dissolve, and use equal parts of this saturated solution and pure water in the cooling system of the engine. If chemically pure calcium chloride is used no trouble will result. Chloride of lime (CaOCl_2) should be avoided.

Crude calcium chloride retails at about \$.08 or \$.10 a lb., while the chemically pure article is worth about \$.25 in small quantities.

Glycerine is an effective cooling agent and as it will not crystallize in the water-jacket it is preferable in this respect to calcium chloride, and it has the further merit of not requiring any renewal during the season, as it does not evaporate. It is therefore only necessary to add pure water to replace that which has evaporated. The main fault ascribed to glycerine is its tendency to soften hose connections. Equal parts of glycerine and water are used.

In using a glycerine solution care should be taken to thoroughly cleanse the jackets of any residue of crystals from calcium solutions previously used, as this residue will thicken and cloud the glycerine solution.

Although wood and denatured alcohol are also used for this purpose, wood alcohol lowers the freezing point more for the quantity used than does the denatured alcohol, but evaporates very rapidly. For this reason it is not used as much as denatured alcohol.

Denatured alcohol is used in almost all proportions with water, but the mixture of half and half is very effective. It does not corrode any of the metal parts or crack the

rubber. It causes no encrustations and leaves no noticeable sediment. Evaporization must of course be compensated for by replenishing with more alcohol, and there is danger of there not being sufficient alcohol to prevent freezing, although an alcoholic odor is very noticeable at the cap.

If alcohol solutions are used, either wood or denatured, a hydrometer should be used daily during cold weather to test the strength. The accompanying table gives the percentages of the two alcohol solutions with corresponding specific gravities:

Table of Specific Gravities of Alcoholic Solutions

Sp. Gr.	1.00	.99	.98	.97	.96	.95	.94	.93	.92
Per Cent Denatured Alcohol	0	7½	15½	23	30	38	46	53	60
Per Cent Wood Alcohol	0	8	17	25	33	41½	49	57½	65

Table of Freezing Points of Alcoholic Solutions by Percentage of Alcohol

Material	Amount in fluid ounces to be added to one gallon of water									
	10	20	30	40	50	60	70	80	90	100
	Freezing Point.									
Glycerine	29	25	21	17	13	9	4	0	-4	-8
Ethyl or Grain Alcohol (denatured)	27	22	18	13	8	4	0	-6	-10	-14
Methyl or Wood Alcohol	25	19	12	5	-5	-18	..	..	..	..
Calcium Chloride (ounces)	27	21	15	5	-10	-38	..	..	..	..
Half Wood Alcohol, Half Glycerine	25	15	-13	..	..	..	..	..	..	..

	Percentage of Alcohol by Volume					
	0	10	20	30	40	50
Ethyl or Grain Alcohol (denatured)	32	24	14	6	-2	-10
Methyl or Wood Alcohol	32	18	4	-10	-23	-37

BOSCH MAGNETO Co., New York City, has closed contracts with the following companies to use Bosch magnetos for the coming season: U. S. Motor Truck Co., Cincinnati; O. Armleder Co., Cincinnati, and the Krebs Commercial Car Co., Clyde, O.

A California Jitney Truck

Mack Jitney Truck used in Los Angeles. It has a speed of 32 m.p.h., is equipped with pneumatic tires, and seats seventeen passengers.



CALIFORNIA'S LATEST "JITNEY" TRUCK

By ALBERT MARPLE

This is the latest "jitney" to make its appearance in Los Angeles, Cal. It is the first one of its kind ever put out by the Mack Truck people, and was manufactured in the Angel City. Rapidly are the "jitney busses" in the western part of this country losing their "cheap" appearance, and in their stead luxurious-appearing vehicles are being substituted. The true fact of the matter is that the jitney business is rapidly outgrowing its present type of vehicle, both in appearance and size, the leaning being toward the motor truck. The truck has "everything on" the ordinary automobile so far as the jitney service is concerned. The modern truck has plenty of speed for this line of work, and at the same time its additional passenger carrying facilities and possibilities are coming in for their share of consideration.

This up-to-the-minute jitney truck has a capacity of 17 passengers and, on account of a special gear ratio, is able to make 32 m.p.h. The bus body is mounted upon a 1½ ton chassis. The body is erected upon Pullman lines, with all the very latest features for convenience and comfort. The exterior is painted a dust gray, with mahogany trimmings. The body is set low so no unnecessary steps are in the way of the passengers when entering or departing. It is constructed for operation by one man, who acts as driver and conductor. The seats are set in a double row, one on either side, with the passageway down the center. Entrance and exit are on the driver's side, while there is an emergency door at the rear. The seats have rattan backs and are upholstered with a fine grade of motor cloth. Cloth was selected in preference to leather to avoid the chance of dust and grime collecting upon the cushions and soiling the clothing of the passengers. The seats are of quarter-sawn oak, with an acid fumed finish so that they show no scratches.

The windows are adjustable and rattling is prevented by an especially designed anti-rattling device. The car is equipped with electric starter, electric lights and electric push buttons, these being operated by the generator. Oversize dual pneumatic tires are located in the rear, while at the front there are single pneumatic tires, these, naturally, assisting materially in the easy-riding qualities of the car.

HOW TO MEASURE SCREW THREADS

As a step toward the promotion of standardized methods for both the casual measurement and continuous inspection of screw cutting tools and their product the Greenfield Tap & Die Corp., of Greenfield, Mass., has issued a bulletin which imparts some valuable information on the proper measuring of screw threads. This is the first of a series of treatises on threading and gaging problems. The bulletin will be gladly sent to any repairman or mechanic upon request.

REDDEN MOTOR TRUCK Co., Detroit, is planning to expand the business on a large schedule, having secured large financial interests in Chicago and Detroit. The company will be enabled to manufacture complete truck makers without being obliged to depend upon any outside manufacturer for parts.

Thought 2-ton was 3¹/₂-ton **ATTERBURY**

A prominent dealer asked to see a 2-ton Atterbury. The chassis was driven up to his door. He came out and looked, and said: "I didn't ask for a 3¹/₂-ton. I want to see a 2-ton."

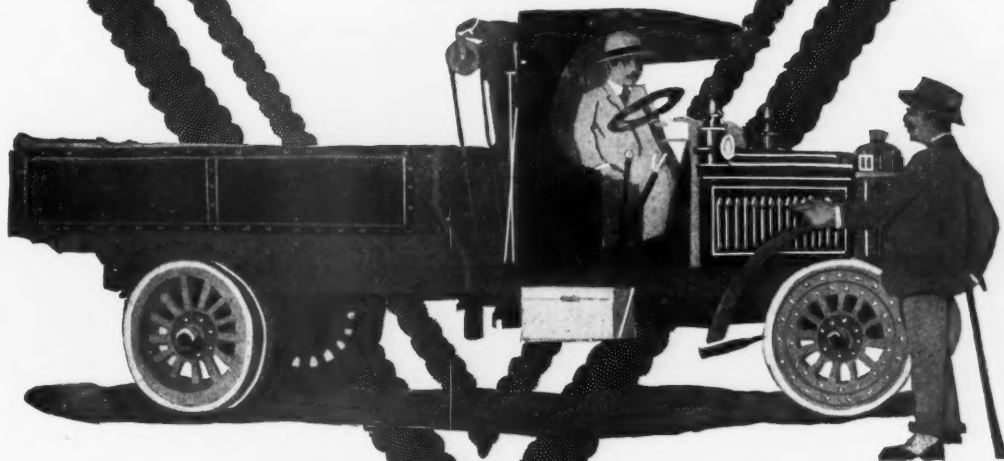
The fact was, that truck was a 2-ton. Although the dealer knew trucks—all makes of them—he was deceived by the fact that the Atterbury is made larger than necessary throughout.

This makes the Atterbury a profitable truck to buy and a profitable truck to sell.

A few more live dealers can now be added. Write or telegraph today for particulars and get the "Atterbury Truck Book."

Atterbury Motor Car Co.

Buffalo, N. Y.



When Writing Please Say "Saw Your Ad. in the CCJ"

Heavy-Duty Truck Proves Profitable

Four-Ton Locomobile Makes Good Hauling Coal and Builders' Supplies

A TRUCK need not be in constant use to be a good investment. This is shown by the performance of a 4-ton Locomobile, in the service of the Newport Coal Co., Newport, Ky. This company does a general hauling business from its yards of builders' supplies, coal and some road work in the nearby Kentucky hills.

Mr. Klingensmith, of the Cincinnati Locomobile branch, studied this company's hauling problems and found the following conditions: They used from four to eight horses each day, had hills to climb over semi-finished roads, short and long hauls, a certain amount of work to be performed each day, according to schedule and this is where it was found that the men and horses were putting in some unusually long hours on certain days.

Figures were compiled from old records and it was found that the average cost per ton-mile amounted to 69 cents.

Several demonstrations of the Locomobile closed the first order which was followed later by the purchase of two more Rikers.

This truck was put into service June 1, 1916, equipped with a hand dump and an accurate record was kept of its performance each month.

It developed that the hand-dump was somewhat burdensome, so it was replaced with a wood hydraulic hoist which saved considerable time and labor.

This truck has now been in service some eight months, has cut the hauling cost down to 21 cents per ton-mile on an average and

has been earning its owner from \$200 to over \$300 each month.

The accompanying record of this truck for the month of September shows the actual performance for each day. It will be observed that the truck was idle almost one-third of the time, figuring on a 10-hour working day.

This month was nominal, although the gasoline consumption was unusually high, due to numerous trips over hills and un-

rolled roads between Newport and Fort Thomas, Ky.

The truck has been given exceptional care and its driver is given a full day's wages even when he works but six hours, and when he puts in overtime he is paid extra.

The experience of this company goes to show that it is much more economical to haul by truck, especially when loads and distance vary.

Traffic Data				Power Costs		Maintenance Costs			
Date	Mileage	Tons Handled	Gallons Gasoline	Pints Oil	Pounds Grease	Gross Earnings	Driver's Wages	Hours Running	Hours Idle
1	22	13-1900	9	1		10.56	2.75	8:30	1:30
2	17	30-1300	10		1/2	21.11	2.75	7:00	3:00
3	Sunday								
4	Labor Day								
5									
6	62	32-440	17	2	3	46.05	6.00	14:30	7:30
7	42	37-	17	1		22.40	2.75	7:00	3:00
8	10	25-700	17	1		20.28	2.75	7:45	2:15
9	10	24-1100	17	1		18.97	2.75	8:00	2:00
10	Sunday								
11	57	23-600	19	1		18.64	2.75	8:00	2:00
12	53	28-400	18	1	2	23.41	2.75	7:30	2:30
13	53	34-800	18	1		28.28	3.75	10:30	3:30
14	52	25-900	18			20.36	2.75	8:00	2:00
15	55	25-400	17	1		20.22	2.75	8:00	2:00
16	55	38-650	17	1		30.66	2.75	7:30	2:30
17	Sunday								
18	60	19-560	20	1		15.42	2.75	7:30	2:30
19	63	28-500	23	1	3	21.80	2.75	7:30	2:30
20	55	38-600	23	1		30.64	3.25	9:00	3:00
21	58	16-400	21	1		12.96	2.75	7:00	2:00
22	60	50-1800	16	1		40.72	2.75	7:30	2:30
23	54	44-530	18	1		37.05	5.25	14:00	3:30
24	Sunday								
25	58	45-960	21	1		35.98	3.75	9:00	4:00
26	72	26-900	17	1		35.76	4.75	13:00	4:00
27	87	44-600	25	1	1 1/2	40.04	4.90	13:00	4:30
28	30	38-	10	1		38.00	2.75	7:00	3:00
29	66	62-770	30	1		32.91	2.75	7:00	3:00
30	28	27-550	9	1		18.42	2.75	6:00	4:00
31	Sunday								
Total	1179	265-1760	427	23	10	640.64	78.40	209:45	72:15
Cost	\$47.16		\$83.26	\$1.15	\$0.60				

Total of above costs	\$163.41
Depreciation of tires	47.16
Depreciation of truck	71.00
Insurance	2.03
Interest at 5 per cent. on \$4,260	21.30
Storage	5.00
Miscellaneous, oil and grease	84.60
Wages of driver	78.40

Total Operating Expense	\$309.49
Gross Earnings	\$640.64
Total Operating Expense	309.49
Net Earnings	\$331.15



Four-Ton Locomobile Truck Used by the Newport Coal Company, Newport, Ky.

This truck has been earning its owners, since June 1, 1916, from \$200 to over \$300 each month at no expense for its repairs

Plenty of the right kind of circulation means quantity results to advertisers in the C.J.

FRANKLIN, PA., is employing a 2-ton Arm-ler truck in the street department, which went into service July 3, 1916, and has worked steadily every day since that time. The truck has worked at hauling a street sweeper and at gathering up sweepings; it has also hauled a scraper in grading dirt streets. This work required running in low gear and a great many stops with the engine running. The cost of operation for 3296 miles figures out at 9 cents per mile in spite of these conditions. The total expense amounted to \$465, doing a great deal more work than two teams did during the previous year at an expense of \$614.92.

